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ALTERNATIVE FUELS

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BEFORE THE

SUBCOMMITTEE ON
ENVIRONMENTAL PROTECTION

OF THE

COMMITTEE ON
ENVIRONMENT AND PUBLIC WORKS
UNITED STATES SENATE

ONE HUNDRED FIRST CONGRESS

SECOND SESSION

JANUARY 11, 1990

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ALTERNATIVE FUELS

THURSDAY, JANUARY 11, 1990

U.S. Senate,
Committee on Environment and Public Works,
Subcommittee on Environmental Protection,
Washington, DC.

The subcommittee met, pursuant to notice, at 9:36 a.m., in room 216, Hart Senate Office Building, Hon. Max Baucus (chairman of the subcommittee) presiding.

Present: Senators Baucus, Chafee, Jeffords, and Lieberman.

OPENING STATEMENT OF HON. MAX BAUCUS, U.S. SENATOR FROM THE STATE OF MONTANA

Senator Baucus. Good morning. This morning the subcommittee will hold its 16th hearing on clean air in this Congress alone. Over the past decade we have held over 80 hearings on acid rain, air toxics, and nonattainment issues. We have heard from scores of experts on these issues.

Today we focus on alternative fuels. We will hear from experts on the role alternative fuels can play in clean air legislation.

I support the use of cleaner automobiles as part of a comprehensive and concerted effort to help areas reach attainment. The administration and others have proposed alternative fuels programs as a way to reduce pollution from automobiles. I believe these proposals merit further investigation.

But I want to be clear: I do not support an alternative fuels program at the expense of a second round of tailpipe standards. Alternative fuels and tighter tailpipe standards are not mutually exclusive. One is not a substitute for the other. In fact, some cities will not reach attainment without further reductions in tailpipe emissions and an effective alternative fuels program.

I'm convinced that additional tightening of auto tailpipe standards will be necessary if we are to reach our clean air objectives; that is, the protection of public health and the environment.

This is not simply rhetoric. The Office of Technology Assessment, in a report issued in July of last year, concluded that currently available control methods will not bring our Nation's 100 ozone nonattainment areas into compliance. OTA estimated that we need a 50-percent reduction in VOC emissions to bring these cities into attainment; however, existing technology can give us only a 35-percent reduction. So, by definition, any strategy to clean up our air cannot rely solely on existing technology.

The bill that the committee reported on December 20th of last year is not limited to existing technology. It includes a variety of nontraditional controls like ozone transport regions, transportation control measures, and controls on stationary sources.

I believe that an alternative fuels program may help us achieve our national clean air goals. Alternative fuels like ethanol/methanol blends, compressed natural gas, and reformulated gasoline all offer some promise in reducing emissions from gasoline-fueled vehicles.

But we will need to judge any alternative fuels program in terms of its true emissions consequences, its effect on vehicle performance, and its feasibility. And we will need to examine whether it will require the development of new vehicles or a new supply infrastructure.

These are some of the broad issues that we will be addressing today.

I thank our witnesses for attending this hearing and sharing their expertise with the subcommittee and look forward to hearing their views.

Now I'd like to turn to the ranking member, a very valuable member of this subcommittee, Senator Chafee.

OPENING STATEMENT OF HON. JOHN H. CHAFEE, U.S. SENATOR FROM THE STATE OF RHODE ISLAND

Senator **Chafee**. Thank you very much, Mr. Chairman. First of all, I'd like to thank you for holding this hearing on alternative fuels.

In his clean air bill, President Bush made some significant new proposals. What were some of those? The acid rain cap, the allowance system, the permit program for sources of air pollution, and also the alternative fuels proposal.

So I think it is important that Congress give each of those ideas and suggestions a fair hearing, and today we are focusing on alternative fuels.

The acid rain trading proposal and the permit proposal are already in the bill that we have reported out from the full committee.

We have made great strides with pollution control technology on automobiles in the last 20 years—there is no question about that—as a result of the Clean Air Act that we passed in 1972. Certification standards reflect reductions of more than 90 percent in hydrocarbon and carbon monoxide emissions. That's an incredible achievement. And there are reductions of more than 75 percent in nitrogen oxide emissions from the 1970 levels. So there is no question that much has been achieved.

You might ask if that isn't enough. The problem is that, as others have pointed out, motor vehicles continue to be a major source of air pollution in the United States. They contribute 40 to 70 percent of the pollutants which cause ozone. In most of the cities which are in nonattainment for carbon monoxide, automobiles cause 90 percent of the problem. Of the cancer cases attributable to air toxics, 55 percent result from mobile source emissions—in other words, automobiles and trucks. Of the U.S. carbon dioxide emissions which cause concern from the greenhouse perspective, 25 percent come from the tailpipes of automobiles.

Just a couple of statistics. It is similar to being on a treadmill here. Yes, the automobile emissions have come down per automobile, the tailpipe emissions have come down dramatically, as I mentioned before, but the total emissions have gone up because the number of vehicles registered in the United States has increased. From 1970 to 1988, 18 years, the number of vehicles registered in the United States has increased 69 percent. Not only that, but every automobile drives more miles. The number of miles traveled in the United States per year increases at the rate of 25 billion miles per year, which is a lot of mileage driven.

So just cleaning up the tailpipes on cars hasn't been enough to ensure healthy air quality. More vehicles taking more trips and traveling more miles in congested traffic has offset much of the gain that we made with the catalytic converter and other pollution control technology.

So as we review the ozone nonattainment problem today, another aspect of the problem becomes immediately apparent. We haven't addressed the fuel side of the equation. If anything, fuels have become dirtier over the past 20 years. Volatility has increased from 9 pounds per square inch revapor pressure—RVP—to more than 11 pounds, on average. The aromatic content of gasoline has gone up as refiners look for replacements for lead and compete in the premium fuel market. Aromatics like benzene are toxic air pollutants and cause an increase in CO_2 emissions.

While we have made some progress with the tailpipe of the vehicle, we haven't done much to improve the quality of the fuel that goes into the tank. As Senator Jeffords mentioned last fall when we were dealing with this, this is a case where the old phrase "garbage in, garbage out" applies.

There is a reason to believe that we could make substantial additional reductions in motor vehicle emissions by modifying gasoline or using other fuels such as natural gas, methanol, ethanol. EPA believes that can be the case. California, which has the worst ozone pollution problem in the Nation, is moving toward alternative fuels. I am delighted that one of our first witnesses will be the distinguished Senator from California, Senator Pete Wilson. We look forward to your comments since you come from an area where they have a lot of problems.

There is some actual data on cars in use which indicates much lower pollution from vehicles using alternative fuels. If this approach can improve air quality, the Federal Government should make sure it is implemented at the earliest reasonable date.

We are here this morning to see what we can do with fuels. We sent to each witness a proposed alternative fuels program which is similar to the one the President introduced, although it has been modified.

Just to briefly describe it, the program would be based on two cars. One, which we're calling the "clean car," would be sold in large numbers in the worst ozone nonattainment areas. It would be 40 percent cleaner for hydrocarbons and 50 percent cleaner for benzene and other hazardous air pollutants than conventional gasoline cars today. The second car we are calling the "ultra clean car." It would be used principally in fleet applications in the early years of the program, although its use could be expanded to the general population in severe ozone areas. It would be 80 percent cleaner on ozone-forming hydrocarbons and 90 percent cleaner on hazardous pollutants than regular gasoline-driven cars.

The program under this proposal would begin in Los Angeles in 1994 with a clean car sold to 150,000 consumers. Why Los Angeles? Los Angeles is the only city listed as extreme under our criteria for judging those cities and areas on nonattainment for ozone.

Beginning in 1997 clean cars would also be sold in severe—which is the next step down from extreme—ozone nonattainment areas. Thirty percent of all vehicles sold in those areas would have to be the clean car when the program is in full operation at the end of the third year.

The requirement that fleet owners purchase ultra clean vehicles would also begin in 1997. An important element in this program is the requirement that auto manufacturers and fuel suppliers make and sell the vehicles and the fuel. That's the only way we're going to get anywhere with this. Without a mandate to sell, we're not likely to get this good match between the vehicles and the reasonably priced fuels that are necessary to convince the consumer to participate in the alternative fuels program.

Demonstrating the feasibility of a vehicle fuel system on a test track in Detroit doesn't really do much to improve air quality, so we want to make sure these clean cars and ultra clean cars actually get into the hands of the consumers in the worst nonattainment areas.

In addition to clean air, there are other advantages in these fuels. For the car buyer, alternative fuels may deliver higher performance. Methanol, for example, is used at the Indianapolis 500. For the fleet owner, some of the alternative fuels are less expensive than gasoline. Natural gas is a bargain with a current price that is equivalent to gasoline at 75 cents a gallon. And there are incentives for the auto makers, too. Each alternative fuel vehicle, under a statute we passed—I think it was the Rockefeller Statute we passed a couple of years ago—each alternative fuel vehicle sold earns a credit against the fuel efficiency standard under the so-called CAFE Program. So it is a plus for the auto manufacturers to sell this.

Finally, the proposal I have circulated is fuel neutral. It gives the auto industry and the oil industry a mandate to produce and sell, but lets the auto industry and the oil industry select the combination and work it out for the technology and the fuel characteristics that can best meet the performance standards in the most cost effective way. It doesn't mandate any specific fuel.

So I hope that this proposal can serve as the basis for a committee amendment when S. 1630 is debated on the Senate floor.

I look forward to the specific recommendations we get from our distinguished witnesses today.

Thank you very much, Mr. Chairman.

Senator BAUCUS. Thank you very much, Senator.

Senator Lieberman.

OPENING STATEMENT OF HON. JOSEPH I. LIEBERMAN, U.S. SENATOR FROM THE STATE OF CONNECTICUT

Senator **Lieberman**. Thank you, Mr. Chairman, for holding this hearing and for your very strong statement this morning.

The testimony that we hear today is going to be extremely useful in our efforts to put together the most comprehensive clean air program for America.

I have reviewed the conclusions of the EPA and the California Air Resources Board about alternative fuels, and I must say that I hope their conclusions are correct, because if they are, alternative fuels will provide an important tool for achieving attainment of the Nation's air quality standards.

I commend Administrator Reilly on his willingness to aggressively seek out new ways to combat the severe health problems that are posed by urban smog. I am heartened by EPA's conclusion that "the primary environmental benefit associated with the alternative fuels program will be significant improvements in ozone levels in the most seriously polluted areas of the country."

A very important side benefit of the entire discussion about alternative fuels is the new movement on the part of the petroleum industry to develop ways to clean up existing gasoline and develop a form of what might be called "super-clean gasoline."

A recent report by General Motors indicated that there are numerous ways that we know of today to clean up gasoline which have not been tried, perhaps because they have not been required.

I hope, Mr. Chairman, that this hearing will explore in some detail how the committee can design an alternative fuels program that is workable for the areas which must implement the program. In that regard, I would like to discuss, during this hearing, some of the questions that have been posed to me by the Association of Northeast Air Managers—NESCAUM. I quote from a letter that they sent to me last fall:

> Different climatology, fleet distribution, vehicle usage patterns, and other parameters may modify the emissions and air quality effects of alternative fuel usage in the Northeast as compared to Southern California. Furthermore, there have been no air quality studies demonstrating conclusively that the air quality benefits in the Northeast would be comparable to those indicated for Southern California; thus, while we support efforts to demonstrate and assess alternative fuels in the Northeast through research and demonstration programs, we cannot offer unqualified support for a widespread commitment to alternative fuels as a central air pollution strategy for the Northeast.

Mr. Chairman, I have to take those words seriously because the folks at NESCAUM have been leaders in trying to bring cleaner air to the Northeastern section of our country and in asking a lot of those of use who live in the Northeast to be part of an effort to do just that. But the questions that NESCAUM raises, which I want to explore with some of the witnesses today, do not deter me from the ultimate conclusion that we have to adopt every possible strategy in our effort to protect the public health of the American people by cleaning up the air that they breathe. I believe that alternative fuels are going to be one very important part of that effort.

Thank you, Mr. Chairman.

Senator **Baucus**. Thank you very much, Senator.

Senator Jeffords.

OPENING STATEMENT OF HON. JAMES M. JEFFORDS, U.S. SENATOR FROM THE STATE OF VERMONT

Senator JEFFORDS. Thank you, Mr. Chairman.

I certainly appreciate your holding this hearing. I enjoyed the very fine statement of our ranking member from Rhode Island who has laid out what I think is a very practical program.

We are here today to discuss the environmental, economic, and health aspects of the various clean fuels that are under consideration for use in our strategy to eliminate ozone pollution.

Our witnesses represent a broad range of parties interested in the implications of proposed Federal actions. This is not a simple issue. If it were, we probably wouldn't be here today.

There is much discussion in developing a fuels program that is fuel neutral. Almost everyone supports this concept, but no one seems to be able to offer a definition that is universally embraced.

In addition, each of the candidate fuels offers varying ranges of benefits with regard to the environment, human health, and energy security. Whether or not a clean fuels program can be developed which is, indeed, fuel neutral remains to be seen. Our efforts are hampered by a lack of comprehensive data on the competing fuels. Different studies yield varying results. So this hearing will be helpful in narrowing the points of disagreement.

Where the evidence indicates that Federal action is warranted, we must not be too timid to act. The urban bus program already incorporated in S. 1630 is an example of a meritorious proposal. The requirement for lower gasoline volatility levels is another.

We should remain mindful of the benefits of ultimately lessening our dependence on fossil fuels by using energy more efficiently and diversifying our energy resources. Proposals in the Senate thus far have not explicitly addressed individual components of gasoline sold for the automobiles currently in service.

Because older cars are significantly dirtier than new cars coming off production lines, it makes sense that we try to improve gasoline that is bought and sold today. Thus, myself, I will concentrate on the most practical—which, in my mind, is the reformulated gasoline option—but also I think we have not really looked as carefully as we should at the most efficient, and that would be such things as electric cars, which seem to be a footnote to almost everybody, as well as the use of hydrogen and oxygen, especially connected with the generation from photovoltaics to get the cost down. It seems to me that these are two other options that deserve more attention than we have given them.

Thank you. I look forward to hearing the testimony of a very distinguished list of witnesses.

Thank you, Mr. Chairman.

Senator BAUCUS. Thank you very much, Senator.

Indeed, we do have a number of distinguished witnesses, beginning with the Honorable Pete Wilson, Senator from the State of California.

Senator Wilson.

STATEMENT OF HON. PETE WILSON, U.S. SENATOR FROM THE STATE OF CALIFORNIA

Senator WILSON. Thank you very much, Mr. Chairman, first for convening this very important hearing. I really should first thank you for the work that you and the committee have done. You and Senator Chafee, Senator Lieberman, Senator Jeffords, and the other members of this committee have performed a prodigious feat. I think I heard you say that this is the 16th hearing in this session of the Congress, alone. I think that you have every right to state that fact with pride. And I think that you have produced an extraordinarily good bill. I think, however, that it can be improved and that it needs to be improved.

I think the convening of these hearings is recognition that the subject of alternative fuels is one that we need to explore thoroughly, because it does hold the promise of a significant improvement. I was much struck by your statement, Mr. Chairman, that tailpipe technology and alternative fuels provisions are not necessarily mutually exclusive. To the contrary, I think that what we ought to see is a market competition. And I think that in many places you are correct—certainly in those that are suffering the most severe kind of problem—there is probably a need for both. This is the case in my State. So I am particularly grateful to you for holding this hearing this morning.

I think that we need to cure what is an omission in S. 1630, the very good bill that you and the members of the committee have already acted upon.

One of the most innovative features of the President's proposed Clean Air Act was its reliance on alternative or clean fuels in the Nation's most severe ozone nonattainment areas. It was just 3 short months ago that I came before you. It was clear to me then that this committee was determined to make major breakthroughs. Indeed, I think S. 1630 promises to do just that.

But I think that the reaction to the alternative fuels proposal was met in some quarters with mixed reaction—I think perhaps that understates it. As I testified earlier, with appropriate legislative encouragement clean fuel vehicles can be shifted from the demonstration fleets of today to the consumer showrooms of tomorrow.

Today this committee, with very strong urging from Senator Chafee, is going to hear three proposals to provide an alternative fuels component to the proposed Clean Air Act. One proposal will be that offered by the administration, and another by the California Clean Fuels Working Group made up of the leadership of the California Air Resources Board, the California Energy Commission, and the South Coast Air Quality Management District. We will be joined in that by agencies of the State of New York. And we will hear a third proposal by our esteemed colleague, Senator Chafee.

I am confident, Mr. Chairman, that from these three proposals a well-crafted alternative fuels amendment can be adopted that mandates not a particular fuel or a particular emission control technology, but an attainable clean air standard that will encourage a marketplace competition which, in turn, produces important benefits not only in terms of public health, but also in terms of the cost and security of our national energy supply—and, I might add, I think a lessened dependency on oil imports with obvious implications for our foreign policy.

The reasons to adopt an alternative fuel amendment are simple and compelling. It is essential for California and for other similarly or prospectively impacted States to obtain ambient air quality.

Federal legislation is crucial to achieve the promise of alternative fuels. Reference has been made to the foundation provided by the Rockefeller-Sharp legislation—a very good beginning. I'm proud to have been a co-sponsor of that legislation.

The third reason is that strong progress can be made in the reduction of toxic air pollution with the kind of Federal provisions that are being proposed in these three proposals that you will consider today.

In building on the foundation of Rockefeller-Sharp, an alternative fuels provision may provide a bridge to the future with the increased dividend of greater energy security. I think that it will also have cost benefits and, as I have said, very significant benefits perhaps in terms of our foreign policy.

The California proposal will be discussed in detail by Mr. Tom Cackette, the deputy executive officer of the California Air Resources Board.

But before I make some general observations I would like to underscore my commitment to work with the administration and with this committee to develop a performance standard approach of the kind that you have addressed already—a performance standard approach to an alternative fuels provision.

Mr. Chairman, one of the great challenges facing California—which parallels that confronting many regions in this country, as well as in other parts of the world—is how to deal with growth—with population growth, and the growth that accompanies that population growth, growth in the auto population.

California's population now numbers over 29 million people, and its future growth is projected to reach 35 million by the end of the decade. California's rate of growth in one year exceeds the entire population of the States of Wyoming or South Dakota or Delaware.

Mr. Chairman, such a rapid rate of growth strains the capacity of my State's infrastructure in many areas, from rapidly diminishing landfill sites to sewage treatment plants. Such a rate of growth frustrates or threatens to frustrate California's pioneering efforts to control air pollution and may threaten the otherwise enormous promise of S. 1630, particularly if the committee bill is not amended to add needed alternative fuel provisions.

The President's proposal to rely extensively on the use of clean alternative fuels as an ozone control strategy received a mixed reaction when first unveiled last summer. Apparently some were caught off guard and feared that the progressive and innovative nature of the concept was one that was too far ahead of its time.

Based on our experience in California, however, we saw something quite different. We saw in the President's clean fuels proposal a useful and decidedly mainstream air pollution control concept that had been undergoing careful and deliberate development in our State for at least the last decade.

Since 1978 California has expended more than $30 million evaluating alternative fuels and vehicles as a means of improving air quality and increasing energy security. Several times that amount is expected to be spent by the mid-1990's. For every public sector dollar invested, the private sector has invested at least three times that amount.

This careful program of long-term investment has laid the foundation for implementation of an alternative fuels program. Thousands of alternative fuel vehicles have been driven millions of miles on California's streets and highways as part of numerous pilot and demonstration programs.

I personally became involved in one of these when, as mayor of the city of San Diego, I authorized the purchase of 25 alternatively fueled Ford Escorts for use in the city's auto fleet.

While further demonstrations will occur on some types of vehicles, the verdict is in for a number of vehicle and fuel combinations. Alternative fuel vehicles work, and they work well. They are ready for large-scale commercial production and use. In fact—the General Motors 1988 Chevrolet Corsica owner's manual for its variable fuel vehicle designed to run on either methanol or gasoline states this vehicle "will run on any of the above-mentioned fuels while meeting today's standards for customer satisfaction, fuel economy, and emission regulation."

An advisory committee commissioned by the California Legislature examined and projected effects of large-scale utilization of alternative fueled vehicles. This study was one of the most extensive scientific, engineering, health, and economy analyses ever conducted on clean fuel. Participants included representatives from domestic and foreign auto manufacturers, energy companies, fuel producers, air quality regulatory agencies, environmental and health organizations, as well as general business organizations.

The California study just recently completed shows that air quality depends both on emission levels, as well as the ozone-forming potential contained in the fuel burned.

The advisory committee concluded that alternative fuels were needed in the greater Los Angeles area to attain clean standards, that they would prove cost effective compared to other control measures expected to be available in the same time frame over a range of future oil price projection, and that energy security would be enhanced.

The board also concluded that such a fuel-neutral program would be optimal in allowing a variety of fuels to compete in the marketplace.

California is moving rapidly towards implementing a phased, long-term program that combines the benefits of advanced vehicle control technology and clean alternative fuels. The California Air Resources Board is expected to formally adopt an alternative fuels program this fall. The proposed program will replace today's vehicles with dramatically cleaner vehicles within a decade and begin the introduction of ultra-clean, almost pollution-free vehicles.

I believe my State's commitment to proceed on such a program is an eloquent argument that alternative fuels is an air pollution control measure whose time has come. I am most encouraged to learn that the State of New York has endorsed California's proposal.

California, in conjunction with New York and in consultation with other States, has produced an alternative fuel proposal that I urge the committee to actively and very seriously consider.

In my view, differences among the California proposal, that proposed by the administration, and that which is offered by my esteemed colleague, Senator Chafee, who has given extraordinary leadership in this area, can be reconciled. I am pleased to find that Senator Chafee's most recent alternative fuels proposal contains many provisions in concept similar to those being advanced in the California proposal.

I request that the committee staff work closely with the administration, with my staff, and that of the California Clean Fuels Working Group and the appropriate New York public agencies to develop a clean fuels amendment so that before S. 1630 is actually considered on the floor the committee and those who are privileged to work with you will have an agreement and be able to forge an amendment on the floor that will considerably improve what is already a very good bill.

I urge careful consideration by the committee of the California proposal and the points that Mr. Cackette will later enumerate. Furthermore, I urge that it serve as the basis for a comprehensive clean fuels amendment to S. 1630.

California is convinced that clean transportation fuels are essential to meet health-based air quality standards and to improve America's energy security.

I am prepared to work very closely with the committee, and I think that we should all be prepared to oppose any national retreat from using the best measures available to reach timely and efficient compliance with a workable and healthful performance standard. This not only means implying the best automotive emission control technology, but also using fuels which are inherently cleaner and lower in toxic emissions.

In closing, let me again acknowledge the leadership that this committee has demonstrated in passing out a clean air bill that takes into account not only a California standard as a national standard, but also a tier II standard, as well. I have confidence that California and the committee can build on this solid foundation by developing a comprehensive air pollution control strategy. We can do this not by trading off clean fuels for tier II, but by recognizing the essential role of clean fuels in a clean air strategy.

Mr. Chairman, I thank you and the members of the committee for your leadership and your hard work and for the privilege of testifying before you this morning.

Senator BAUCUS. Thank you very much, Senator. First let me thank you for that strong statement, and also thank you for California's leadership in air control technologies. California, in many ways, has lead the way in this Nation and has provided many ideas and, in fact, in some sense, the leadership even to the strongest proponents in this committee for finding the way to clean up the air.

I am struck by the strong statement in your testimony that California needs both round two and an alternative fuels program in order to reach attainment. Is that correct?

Senator **Wilson**. That is correct. As I said, I think that what we will see over a period of years is a marketplace competition. Some of the energy companies in California have already sought to provide fuels for one class of automobiles—those that are pre-catalytic converter. That is a standard that will be useful for a time when all automobiles, new cars, have a different technology. A different form of fuel I think will be required.

What we're saying is that by going to the kind of alternative fuels that are provided as an incentive under the Rockefeller legislation, we are looking to see a mandate that will give the industry assurance that there will be a market, but we also recognize that, as under the Rockefeller proposal, other automobiles will exist. There needs to be, for those that burn only gasoline, that kind of tier two technology—that sort of tailpipe technology—upon which you have laid proper emphasis.

Senator **Baucus**. That's the point I was going to make. Not all cars will be clean fuel cars.

Senator **Wilson**. No, they won't, although——

Senator **Baucus**. Therefore, round two is also necessary at least in some areas of the country—that is, a combination of both is necessary.

Senator **Wilson**. I think that is quite true. My own long-range projection is that at some point, because of market forces and because of other desirable attributes, we will see more and more States, more and more communities, and more and more consumers move by choice to the kind of alternative fuel vehicles that now are not just a possibility but a very dramatic improvement.

Senator **Baucus**. Thank you very much.

Senator Chafee made a good suggestion, Senator, and that is that when each of the remaining members of the subcommittee have finished asking you questions, we'd be honored to have you come and join us if you also want to participate in this hearing.

Senator **Wilson**. Thank you very much, Mr. Chairman.

Senator **Baucus**. Thank you.

Senator **Chafee**. Thank you, Mr. Chairman.

Senator, thank you for your testimony and your interest in all of this. California is a moving force in all our deliberations here because we can point in so many instances and say, "Look, California is doing it already, so what is the problem?" Automobile manufacturers are producing an automobile—or will—to meet the California standards, and so these standards we have incorporated to a considerable degree, and certainly the first stage of our requirements in tailpipe emissions here.

Did you say the population of California was 29 million?

Senator **Wilson**. Yes, sir. It is actually more than that. It is difficult from day to day to keep pace with it. But, as I indicated, we are experiencing a steady and relentless population growth that in the last two years has exceeded the populations of Delaware or Wyoming or South Dakota.

Senator **Chafee**. It was so kind not to include Rhode Island in that.

Senator **Baucus**. And Montana, as well.

Senator **Chafee**. You showed great judiciousness, and I think you are going to go a long way as far as this committee is concerned.

Thank you very much, Senator.

Senator **Wilson**. Thank you, sir.

Senator **Baucus**. Senator Lieberman.

Senator **Lieberman**. Thank you, Mr. Chairman. I have no questions. I'd just like to thank Senator Wilson for his leadership in this effort.

Senator **Baucus**. Senator Jeffords.

Senator **Jeffords**. Also no questions, but great commendation for my colleague from California. We're going to need your help on the floor. We deeply appreciate your being here today.

Senator **Wilson**. Thank you very much.

Gentlemen, I am quite sincere. This committee has really done extraordinary work. I think that you have achieved a great deal in a very short period of time. California has a living laboratory of necessity concerned with this problem, so we are very grateful for the effort that you're making here.

Senator **Baucus**. Thank you very much, Senator.

Our next scheduled witness is the Honorable Mike Andrews from Texas.

Congressman, welcome to the committee.

Before you begin, I would like to acknowledge receipt of a statement from Senator Burns which will be made a part of the record of this hearing.

[The statement referred to follows:]

STATEMENT OF SENATOR CONRAD BURNS
ON
ALTERNATIVE FUELS
SENATE ENVIRONMENT AND PUBLIC WORKS COMMITTEE
January 11, 1990

Mr. Chairman,

Thank you for the opportunity to submit this statement on the alternative fuels portion of the Amendments to the Clean Air Act. There may not be too many things that I do in the Senate over the next several years that are more important to the people of Montana.

Everyone agrees that air pollution is a major problem and the differences occur about the priorities for action and the time periods. We are fortunate that we have so many choices that we can debate about what to do. For my part, the first priority is to urge a balanced approach with a number of options. I believe that S. 1630 can be improved to be made acceptable. But one change that is required is to place alternative fuels on an equal playing field with cleaner petroleum emissions. The options are compatible and not mutually exclusive.

Fundamentally speaking, there are two ways to produce energy and still achieve cleaner air. One way is to burn relatively dirtier fuels and then use scrubbers or catalytic converters to clean up the emissions. Another way is to burn cleaner fuels in the first place. Obviously, America needs to produce energy both ways and to protect the air quality better both ways.

We have focused too much on the first approach in the past. The Amendments before this Committee provide a rare opportunity to achieve a greater balance in our national energy strategy. You see, I believe that we need to start now to mandate the technology that will allow us to extract the energy the way we want from coal. To date, we have not been sufficiently aggressive in our clean coal technology efforts. We have spent too much money on trying to clean up dirty fuels and not enough money on making cleaner fuels. Up to now, the record of accomplishment is not good. There is too much sulphur causing acid rain, too much carbon dioxide causing concern about global warming and not enough knowledge about or commitment to the development of the technology and infrastructure adjustments that are required in the course of this new decade.

The good news is that Montana and a number of other Western states have huge demonstrated coal reserves that we can utilize to help clean up the environment if --and this is critical-- we start intelligent planning right now in these Amendments. I have contacted several other Senators from coal producing states to enlist their support for this effort. It is time for those concerned about the environment and those concerned about the development of our nation's largest energy resource base --coal-- to work together.

STATEMENT OF HON. MIKE ANDREWS, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF TEXAS

Mr. ANDREWS. Thank you very much, Mr. Chairman. I'll try to be very brief. I appreciate very much the opportunity you have given me to come over and visit with you this morning about alternative fuels.

I come before you today as a Member of Congress from a producing State, Texas, and urge you to adopt the strongest possible measures that will ensure the use of clean-burning alternative fuels.

I have gotten involved in this issue for one simple reason: anyone who has seen the brown haze that often hangs over my home of Houston and other large cities like Los Angeles and New York knows that we have got a serious crisis in our air quality. In fact, Houston currently ranks as one of the Nation's most polluted cities. Our environment and our health are at risk.

The effects of our dirty air are becoming increasingly evident. Respiratory diseases like emphysema, bronchitis, and lung cancer are on the rise. Especially troubling is the increase in asthma among preschool aged children. The numbers are even higher among inner city children.

As a result of air pollution in the Los Angeles area, according to the South Coast Air Quality Management District, the average child there has a lung capacity 15 percent below the national norm. We must attack the smog problem and do it now.

The most effective way to do this is to substantially reduce vehicle emissions. As has been testified earlier, in most areas like Houston, over 50 percent of the smog comes from cars, trucks, and buses. We are not going to stop driving. In fact, vehicle miles travelled is expected to double in the 1990's. As a result, substantially reducing emissions on a car-by-car basis is absolutely essential.

One way to reduce emissions is to establish tighter tailpipe standards for gasoline-powered vehicles. We are doing this. This is happening.

However, we are in a position to take a bigger step. We have the technology today to run vehicles on significantly cleaner alternative fuels. The benefits of using alternative fuels are clear. According to the Department of Energy, natural gas vehicles, for example, produce at least 50 percent less carbon monoxide and similar nitrous oxide emissions than gasoline.

A June 1988, Congressional Research Service Study estimates that using natural gas instead of gasoline results in a 30 percent reduction in carbon dioxide emissions.

EPA estimates that running a vehicle on natural gas can reduce ozone-causing emissions by 50 to 80 percent. Similar gains have been shown by methanol and ethanol.

Cities like Houston simply must have a strong alternative fuels program. The clean air bill is the most obvious vehicle for establishing such a program. It is a great opportunity. A strong alternative fuels component in the Clean Air Act is essential, and I urge your support for such a provision.

However, there is another essential piece of the puzzle. Economic incentives are imperative in getting a widespread alternative fuels program off the ground.

I have introduced a bill which I think provides such incentives. H.R. 2269, the Alternative Fuels Incentive Act, would provide a 20-percent tax credit for equipment to convert a vehicle to run on a clean-burning fuel, a 20-percent credit for alternative fuel refueling station equipment, and a 20-percent credit for the fuel system of a new alternative fuel vehicle.

The Joint Committee on Taxation estimates that this legislation would cost only $20 million over 5 years. The initial effect of this bill would be to encourage private and public fleet owners to convert their vehicles to run on clean-burning fuels. This really is a key area.

Houston, for example, has the largest private fleet commuter system in the country. We are proud of that. Our mass transit problem has been much improved as a result of that kind of private sector involvement. Converting much of this fleet to run on clean-burning alternative fuels could greatly reduce our air pollution problem.

My bill would also encourage the development of a badly needed alternative fuels infrastructure in this country.

The effectiveness of such incentives can clearly be seen in Canada, perhaps the leading nation in the development of alternative fuels. The key to getting a widespread program off the ground in Canada has been economic incentives.

In 1983 the Canadian Government began offering grants of $500 for private and commercial vehicle conversions to compress natural gas. In addition, the natural gas refueling station program in Canada offers a government contribution of up to $50,000 for the building of retail refueling stations.

As evidenced by the rapid growth in the Canadian natural gas vehicle fleet, these programs have been extremely successful. A substantial number of vehicles have been converted to run on compressed natural gas in that country, and these vehicles are serviced by an infrastructure of 120 public refueling stations today.

Unlike the Canadian program, my legislation does not require direct funding by the Federal Government. Using tax incentives I think is a fiscally wise approach to develop the use of cleaner fuels.

In summary, Mr. Chairman, we've got to have a strong alternative fuel policy, we've got to address the clean air needs, and I urge the members of this panel to consider, in addition to stringent controls, the idea of tax incentives, as well, to encourage conversion.

It really seems to me that in large cities like Houston and Los Angeles and States like Texas and California the future will involve all of the things that have been touched on today, from electric cars to reformulated gasoline. There is certainly a public policy reason not to play favorites in the kind of fuel we encourage, but I think it is important that we create every kind of incentive to encourage the private sector to quickly make conversation to alternative fuels.

I want to thank the committee for allowing me to come by and testify today about my legislation. Thank you.

Senator BAUCUS. Thank you very much, Congressman. I believe implicit in your testimony is your view that different alternative fuels programs should be available in different parts of the country—that is, perhaps natural gas might be preferred for Houston more than perhaps some other part of the country, whereas some other nonattainment area may suggest a methanol-based fuel or ethanol, for example. Some parts of the country might want ethanol.

One criticism, though, of all of that is that it becomes incredibly complex and tends to impede mobility in this country, and it may raise very high infrastructure costs. Do you have any concerns that perhaps too many different fuels would cause unnecessary costs and really create more problems than it solves?

Mr. ANDREWS. I think in the short run there are going to be costs. Conversion of major fleets in this country—especially in the large, populated, urban areas—is going to be expensive. And there are going to be infrastructure costs much higher than what we have today. But I think the worst thing we could do is try to play favorites in terms of what fuel we go to. You are right: what may work in Texas may not be appropriate in the Midwest.

Senator BAUCUS. Does Houston need alternative fuels to meet round two?

Mr. ANDREWS. Yes.

Senator BAUCUS. Does Houston need alternative fuels to reach attainment?

Mr. ANDREWS. I believe we do.

Senator BAUCUS. I'm talking round two and alternative fuels. Are both necessary to reach attainment in this area?

Mr. ANDREWS. I think that we have to have both. I especially think our future will see greater use of alternative fuels and a much more developed reformulated gasoline.

I think two things are going to happen. One, we are going to gain by new technologies. As I'm sure you will hear today, some of the advances that have been made in reformulated gasoline are very ambitious and very encouraging. At the same time, I think the marketplace is going to dictate the direction that the country goes, and it may be more complex than what we have today. I'm not sure that is necessarily a bad thing if we clean up the environment. What may work in the Northeast may be very different from what works in a State like Texas.

Senator BAUCUS. Thank you very much.

Mr. ANDREWS. Thank you, Mr. Chairman.

Senator BAUCUS. Senator Chafee.

Senator CHAFEE. What is your bill? Did you say H.R. 2269?

Mr. ANDREWS. Yes.

Senator CHAFEE. That's interesting. I must say I was amazed at the Joint Tax Committee that gave that estimate. Did you say $20 million?

Mr. ANDREWS. That is correct. This does not cost a lot of money from the Treasury. Even with those costs, I think you have to weigh the encouraging aspects of what we have seen in Canada in terms of giving private fleet owners incentives to make what are very expensive initial conversions.

Senator CHAFEE. Thank you very much. We appreciate your coming today.

Mr. ANDREWS. Thank you, Senator.

Senator BAUCUS. Senator Lieberman.

Senator LIEBERMAN. No questions. Thank you very much for your helpful testimony.

Senator BAUCUS. Senator Wilson.

Senator WILSON. No questions.

Senator BAUCUS. Thank you.

Next we have the Honorable Bill Rosenberg, Assistant Administrator for Air at the EPA.

I'd like to remind all of our witnesses that we have many witnesses. Beginning at this point, I'm going to ask each witness, of necessity, in deference to the others, to hold himself or herself to 5 minutes.

STATEMENT OF HON. WILLIAM ROSENBERG, ASSISTANT ADMINISTRATOR FOR AIR, ENVIRONMENTAL PROTECTION AGENCY, ACCOMPANIED BY RICHARD WILSON

Mr. ROSENBERG. Thank you, Mr. Chairman and members of the committee. We appreciate the opportunity to have this hearing, as you promised in the earlier sessions before your committee. We are particularly grateful to Senator Chafee for the work he has done in this area in working with the administration, and for Senator Lieberman for the work that you and your staff have done in the last few weeks with our people to prepare for this hearing.

President Bush submitted a comprehensive Clean Air Act, as did the committee develop a comprehensive Clean Air Act. In our proposal, clean fuels for automotive use was a very significant component, and it is one of the President's highest priorities in enactment of clean air legislation.

On my left is Richard Wilson, who will be available to answer any technical questions that I am unable to answer after my testimony.

The President's program will affect our dirtiest cities. While we appreciate Senator Wilson's testimony that California does need it more than anybody else—and we agree with that—there are nine cities in this country with ozone design levels that are 50 percent higher than the health standards. And so the effort to develop cleaner fuels and cleaner cars, cleaner than the national standard concentrated itself in these nine cities all around the country—in the Northeast, in the Upper Midwest, in the Houston area, and in the California area.

Under our program, other cities that choose to participate in this type of program can opt in if that is the best alternative they see to cleaning the air. So we don't anticipate these to be the only cities that will do it, but our proposal says these are the required cities.

In a nutshell, the President's program is a program that would find that 30 percent of the new cars sold in these cities by 1997 would be capable of operating on cleaner fuels. The object here is to achieve a performance standard for these vehicles that, in the 1995 time frame, is roughly 30 percent better than the standard car, and, in the year 2000 time frame, 80 or 90 percent cleaner. By cleaner we mean cleaner for VOC's as well as air toxics.

It is our opinion that without cleaner fuels and cleaner technology on the vehicles these cities cannot reach attainment.

The proposal by the President is also, in our opinion, the least-cost solution. By offering the marketplace—the oil and auto industries—the opportunity to optimize the technology on the car and on the fuels. And it is very important, in achieving a proposal, that we stimulate technology in these two areas and do believe the Senator Chafee's proposal, as well as the Administration's proposal, does that.

There are just two technical charts that I will go through quickly. One is to indicate that on a per car basis the President's proposals greatly reduce per car emissions. The current car is the 1988 gasoline-driven car, which is a lot cleaner than it has been. These are the in-use standards.

What this chart shows is that the various proposals that we had in our bill—many of which are in your bill, as well--would reduce the emissions from the current car by 60 percent. That's more what I would call conventional technology—things like improved volatility of the fuel, a 0.25 tailpipe, diagnostic systems on the car, control of refueling emissions, better inspection and maintenance. The whole conventional aspect of the President's bill would reduce the emissions on today's cars by 60 percent per vehicle.

What is kind of interesting in this chart is that the top part shows the amount of emissions caused by evaporation, and the black at the bottom is the amount that comes out the tailpipe. What is overwhelming is that 70 percent of today's problems come from evaporation of the fuel in the distribution of the fuel, in the refueling of the fuel, and in the operation of the car, and only 30 percent of the problem comes out of the tailpipe.

The President's plan would be to develop cleaner cars over time by providing a challenge to the industry to come up with a combination of cleaner fuels and cleaner cars.

The next chart demonstrates a similar view of air toxic impacts of clean fuels. The current cars represent the first bar, which shows the amount of benzene and formaldehyde and butadene cancer incidents caused in association with that car. Over time we want to have a program that will reduce that.

One of the best ways to reduce that—to quote Senator Chafee, who quoted Senator Jeffords—is "garbage in, garbage out." To the extent we can reduce the toxicity of what goes in, we will reduce the air toxic deaths. And, as we focus on an air toxics bill, that only deals with 20 percent of the universe; 50 percent of the universe on air toxics is from cars.

The next chart points out that the American Petroleum Institute recognizes this because this is a copy of the sticker on many gas tanks which shows the health warning related to gasoline. While it is very important to note that methanol or ethanol or CNG have their own health issues, we must compare to gasoline. We have every reason to expect that if we had alternative fuels, that they would be at least as safe, it not more safe, than the current fuels that we now use.

Senator BAUCUS. I'm going to have to ask you to summarize, Bill.

Mr. ROSENBERG. Okay. I'll make one more point.

In summary, the President's clean fuel program is to require 30 percent of the vehicles to achieve much greater hydrocarbon and toxic emissions. Most important from our position is the fact that it is a market-based program where the industry is challenged to meet the standards in the most cost effective way using any combination of fuel and technology. It is a fuel-neutral program that would allow methanol, ethanol, compressed natural gas, propane, electricity, and reformulated gas to participate.

The concept of reformulated gas we believe was brought forth by the challenge of the President's bill to begin with, and we think it is very important and we wish to work with this committee to develop a program along the line of Senator Chafee's proposal to insert into the Senate discussion to achieve a clean fuels initiative that is market based, that is fuel neutral, that gets the comparable environmental benefits that we had proposed, and that is cost effective.

We pledge to work with Senator Chafee and the committee in the next few weeks to kind of use Senator Chafee's bill as the basis for conversation to achieve that goal.

Senator BAUCUS. Thank you very much, Bill.

You mentioned the President's bill is to mandate 30 percent of the fleet be clean fuel vehicles. How do you require the dealers to buy them and then to sell them? Currently dealers order cars from manufacturers, so how are you mechanically going to reach the goal?

Mr. ROSENBERG. It is our sense that it is the responsibility of the manufacturers to price and promote and provide the incentives to sell these vehicles.

As you know, Senator, we're not talking about crazy cars. We're talking about cars that are very similar to the other cars that would be sold, with an additional option that would allow the car to operate either on conventional gasoline or a reformulated gasoline or an alternative fuel.

Senator BAUCUS. What if the consumers don't want to buy them? What if consumers feel it is not worth the hassle because there aren't enough alternative fuel pumps around? Most pumps are still conventional fuel. It is easier. They don't want to buy them.

Mr. ROSENBERG. I'm glad you asked that question, Senator.

Senator BAUCUS. Good. I know you're ready for it.

Mr. ROSENBERG. The USA Today published this poll which shows that 68 percent of the consumers say that car makers should be required to build cars that run on alternative fuels. And 50 percent of them say they would pay significant funds to do that in the nature of what we believe the additional cost would be, although we're not sure that the car companies would, on the 7 percent of the fleet that this would require, necessarily pass that on to consumers. We believe this is the least cost way for the auto industry, as well as the consumers, to get cleaner air. And that would be part of the overall construction cost of the auto industry.

Everything that we know about it indicates that the cars will perform well—certainly the studies and examples in California indicate that—and that the fuel, by creating a competitive fuel opportunity for ethanol, methanol, and CNG, might even result in lower-cost gasoline and fuels to the nation, as a whole.

So we believe this is a minimal cost and dislocation question compared to many of the other things imposed in the Clean Air Act to get to the health standards. The problem is complex. We're not proposing a simple solution, but an effective one, we believe.

Senator BAUCUS. You heard Senator Wilson say—and you know Mr. Cackette from California will say—that California absolutely needs both alternative fuels and round two. They are the experts in California. Isn't it correct that California, because they believe so, needs both clean fuels and round two?

Mr. ROSENBERG. Our sense is that—we don't doubt that California needs much cleaner fuels and cleaner cars. We have a provision in our bill in the current law that allows California to establish its own standards, which it has done in the past. We commend them for the research and effort in that area.

Our approach would be more market-based than mandating technology in phase two and fuels. We would prefer to establish an overall performance standard and allow the States to opt up to increase that performance standard.

Senator BAUCUS. California says that won't work. They need both round two and clean fuels. Total market, alone, won't do it. That's what California says.

Mr. ROSENBERG. We have no problem with California continuing to require cleaner cars in California, which they do under current law, and believe that's the best way to proceed.

Senator BAUCUS. Isn't it also true in Houston? You heard the Congressman from Texas say Houston also needs round two, and the Northeast States are starting to move toward California standards.

Mr. ROSENBERG. Again, we have no opposition whatsoever and support the idea of a tighter performance standard. Where we may differ with the committee—and we need to discuss this some more—is that whatever that performance standard is, allow the marketplace to select the combination of fuel and technology to get there, which is embodied in many of these bills. I believe the administration would just take a stronger position on the overall working of that marketplace.

But under our proposal we would allow the different States to opt up in terms of the percentage of vehicles, which effectively would provide the incentive for both cleaner technology in the cars and the fuels.

Senator BAUCUS. I have another question. How in the world could EPA administer this increased complexity which you just admitted? Don't forget, in addition to all your present obligations under current law, this bill, S. 1630, adds very significant additional responsibilities apart from alternative fuels. It has an allowance system for acid rain that will be incredibly complex. It has an emissions allowance system, which would be additional EPA responsibility. The toxic controls in this bill are much greater and much more complex than current law. There are new SIP's to review from each State. There will be 15,000 new operating permits you have to deal with. It has additional chlorofluorocarbon controls. There are new controls on new incinerators. How in the world, in addition to all of that, is the EPA also going to administer an incredibly complex alternative fuels program?

Mr. ROSENBERG. I have two answers to that, Senator.

First, that's why we want the market to make the choices. We want to establish the performance standards and require the industries to get together to achieve those performance standards without EPA mandating very precise, specific solutions—either this fuel or that fuel or this technology or that technology. And we and you embodied that concept in the acid rain bill.

Second, this is very much like the unleaded fuel phase in in the 1970's where with the combination of improved technology on the vehicle—the catalytic converter—and the unleaded fuel at the pump, one and one equaled six or seven. We would anticipate that what we learned in the unleaded fuel phase down, which worked so well and performed so well for this Nation, can work in this area, as well.

Senator BAUCUS. I beg to differ with you, Bill. The lead phase in was so much more simple compared with this. We're not mandating a separate alternative. Earlier it was nonleaded fuel compared to leaded gasoline. We're talking about—as you, yourself, said—a wide range. Let the market place decide. We're talking about a combination between fuels, on the one hand—perhaps reformulated gasoline—and constructing new kinds of cars, on the other. This is incredibly more complex. And you can't have your cake and eat it, either. You say let the marketplace decide. Yet, in your answer you also say require automobiles to do this.

I don't think you really mean a true marketplace. The bill mandates a certain number of cars have to be manufactured and sold, so it is not really a marketplace that you're talking about.

Mr. ROSENBERG. What we mean by marketplace is to establish a performance standard, and if the auto industry, working with the oil industry, chooses to meet that with one fuel or another or one technology or another, as long as we can certify that they are meeting that standard that's good enough.

This is a very complex problem. The health problem is very difficult to solve. It is our respectful judgment that the best way to go forward to solve that problem into the late 1990's, beyond what we would consider together to be conventional approaches, is to come to the fork in the road and stop relying solely on the technology of the car to get us to reduce automotive emissions, which constitute 50 percent of the problem, but to move down two paths—one, the car technology; and the other, the fuel technology—so that, in combination, we deal with this very persistent and complex problem. We are at a fork road here, and we really do hope that this committee would include in its deliberations a provision to allow these choices to occur over the next ten years to clean up the air.

Senator BAUCUS. Thank you. My time is up.

Senator Chafee.

Senator CHAFEE. Thank you, Mr. Chairman.

One of the questions that has been raised here, Mr. Rosenberg, is that there will be a need for changes in the so-called infrastructure for distribution of these alternative fuels. Do you have any comment in association with that concern?

Mr. ROSENBERG. Well, that's true. It is necessary, under our proposal—and I assume under yours, too—that the fuels be made readily available. Therefore, in each major gas station there would be a pump for the alternative fuel. We had a very similar requirement under unleaded fuel. Before the volumes picked up to make this unleaded fuel the predominant fuel we started out that one pump in a station had the fuel, and then eventually two and three, and there are premium fuels on top of it.

So we think that in the scope of the cost of the program that this is significant, but not impossible to deal with. We estimate that many of the gas stations are already, under the underground storage tank programs, required to improve their tanks, for example, to double-bottom tanks. We know that New York and California are requiring that. It is that type of health improvement that will enable alternative fuels to be handled, as well. It is something we need to work on with the gasoline dealerships. But in terms of the overall cost of the program, the new infrastructure might add a penny or a penny and a half per gallon to the cost, and with the proper phase in we think that is feasible.

Senator CHAFEE. I noticed one thing. You had your map there of where the cities are located. Certainly each of them seem to be accessible for tanker delivery. In other words, they were all either coastal cities or on the Great Lakes, so that so far, anyway, they can all be serviced by ship and thus we don't get into the pipeline problem that you might have if they were situated elsewhere.

Mr. ROSENBERG. That's correct, Senator. And in the midwest, for example, that's the home of most of the ethanol production. In Houston, where there is a lot of natural gas, and to the extent that we have CNG, that is available every place in the country. So I think you are absolutely correct.

Senator CHAFEE. The automobile industry is resisting the mandate to produce the cars and have them available in the nonattainment areas. Now, you provide that and we provide that—at least in the amendment that I have presented here. The automobile industry, I think, will say that if the demand is there then they will produce them. But this seems to me to be a chicken and egg situation. Unless the car is there, the customer is not liable to ask for it. Therefore, I agree with your approach—the administration's approach—that they've got to produce X amount of cars in these certain nonattainment areas and sell them so the customer has it available.

Mr. ROSENBERG. That's correct, Senator. What we're doing here that is a little different from the standards that we've applied in other areas. Where again, the Congress has set the standard for cars, generally, and in this bill we and the Congress propose tighter standards for cars and fuels. In saying that for this increment we would allow the auto industry to specify not only the technology but the fuel to go with that technology which might, we would hope, and EPA would be in a rulemaking mode to look at that to determine whether we agreed with it and to end up with an optimum solution from a cost point of view.

The bill that we proposed to the Congress was 14 to 19 billion. We are in the process of costing out the Senate's version of the bill. It is a very expensive bill, and it is very imperative that we achieve these benefits at the lowest cost. It simply doesn't make sense to say that the only thing that we will require the car companies to do is to fix the car rather than to run the car on cleaner fuels.

We have had lots of examples like Denver where they have tried to deal with the carbon monoxide problem and by putting in oxygenated fuel that improved it dramatically. We have every reason to believe that the most cost effective solution at the margin for these tough problems is this optimal mix.

We have always required the industries to do this in the area of safety and in the area of public health, and this is not any different from other statutes.

Senator CHAFEE. What I worry about is that if you don't go to the second stage of the tailpipe standards and you sell an automobile with the flexible fuel adjustment, and so therefore when they've got the methanol or the M-85, or whatever it is—ethanol—in there, they're doing fine. But then they just switch it over into the regular gasoline and drive around and their tailpipe emissions don't reach the standards we want them to reach. What do you say to that?

Mr. ROSENBERG. I think that, in your bill, you did put a provision for requiring the States and the oil industry to, in fact, sell the fuel. We have no objection to that additional requirement, which is comparable to the requirement that we have on the auto industry to sell the cars. They would have to internally price and promote the fuels.

Senator CHAFEE. My time is up, but, just quickly, the driver gets the automobile that can run on alternative fuel, but he doesn't have to use that alternative fuel in his car. He has a flexible fuel car. So then he puts the regular unleaded gasoline in. Under your proposals, where you don't meet the second round, the tailpipe emissions under those circumstances where he is not using the alternative fuel don't meet the standards. Now, what do you say to that?

Mr. ROSENBERG. We are holding the States responsible under their SIP program for establishing State policies—tax policies and other policies—that, in fact, promote the sale of the fuel so that it is used. It does not do any good environmentally not to use these cleaner fuels. And you, in your bill, do the same thing. You are actually more explicit.

The solution of the problem is to put a burden on the relevant industries to sell the fuel without telling them how to do it. They may promote it, they may treat it as a premium fuel. There is certainly a lot of capacity to promote and sell and price cars and fuels. We do not intend to have a Federal price regulation of any type, but we do expect that those fuels would be sold and the cars would be sold, and, by having volume controls at the State level, we could avoid that problem.

It is very important to address the problem of assuring that the cars are sold and the fuels are sold. By mandating it the way you and we have, that puts the burden on the industries to figure out the best way to do that.

Senator CHAFEE. Thank you. And thank you, Mr. Chairman.

Senator BAUCUS. Senator Lieberman.

Senator LIEBERMAN. Thank you, Mr. Chairman.

Again, I'd just state to Mr. Rosenberg how strongly I feel about the significant contributions the administration has made in focusing our attention, not only on the automobile, but on what goes into it. I appreciate that.

I want, however, having said that, to now ask you some of the critical questions that people have raised about the administration proposal.

First, there is some suspicion that the proposal is biased toward the use of methanol—that it is not genuinely a fuel-neutral proposal. I hear that particularly from people who are interested in the use of natural gas. What do you say to that?

Mr. ROSENBERG. It is an unfortunate view. It is not our view. We would, as the Senator would, seek to establish performance standards and allow the manufacturers to meet those standards with any combination of fuel or technology to achieve those standards. So it is not, and never has been, biased. But that has been one of the images. That's just not the way our language reads. It is not our intent. And we would imagine that, quite frankly, under our proposal, in some places there would be reformulated gasoline, in other places there would be CNG and perhaps M-85 or E-85 type gasolines. We would welcome any corrections that the committee might have in our language to make that absolutely clear and put in an affirmative statement, if that was necessary.

Senator LIEBERMAN. Okay. I appreciate that answer.

The Office of Technology Assessment, in its report to us, has questioned some of the basic assumptions of the EPA proposal. The World Resources Institute, which is a respected environmental group, suggested that this goes off in the wrong direction. Our own people at NESCAUM are troubled about the implications for the Northeast.

I wonder, as a matter of strategy with some of these questions being raised—and I'll ask you to respond to some of those questions specifically in a minute. But, as a matter of strategy, why not begin with a true demonstration program for alternative fuels in California or with fleet vehicles throughout the country or in the severe and extreme ozone areas rather than start with this more massive program?

Mr. ROSENBERG. In a sense, that is what will happen, because none of these requirements go into effect until 1995. There are, in fact, a whole series of demonstrations—technology and fuel demonstrations—going forward as we speak which will provide the manufacturers with the kind of data necessary to achieve a 1995 on-the-ground standard. That's 6 years from now.

The reason we don't want to simply focus on California is the fact that the problem exists in California in a very serious way, but it exists in many other places, as well. We feel that it is necessary to start the process so that by the end of the decade we have the opportunity for much cleaner fuels and much cleaner cars—establish the infrastructure.

What we anticipate in phase one, 1995, is that, in addition to the fleet program that would be ultra clean cars, you'd have cars that are very similar to the current cars. You're not really talking about a fundamentally new generation of vehicles. The flexible fuel vehicle is a vehicle that would be the same car with a censure that allows a broader combination of alcohol fuels and gasoline than the traditional 90/10 gasohol.

I was driving in a car with Chuck Umbricht in California and we started off with 65 percent gasoline in the vehicle and he filled it up with M-85 and it went to 27 percent. These current vehicles can run on any combination, and hopefully they'll run on a higher combination than 65 percent. He had come from a different part of the State that didn't sell the fuel, but he was not inconvenienced because of that.

So we think that by delaying it to 1995, by phasing it in, we're talking about half of the program annually in 1995 phasing into 100 percent of the program in 1997. There is a phase in, and certainly we're open to discussion of other types of phase in that the Senator may have or you might have to get us to 1997 or so where it is fully operative.

Senator LIEBERMAN. Clearly, the basis for your answer to the question that you have just given is that you have a basic confidence in the efficiency of the alternative fuels idea. How do you respond to the concerns of the Northeast air managers that the particular climatology of the Northeast may present some separate problems that it is not clear that the alternative fuels will help—and they may even hurt the NO_X problem that is somewhat more intense in the Northeast? Is this an easily transportable experiment?

Mr. ROSENBERG. I'm going to make one comment and ask Dick Wilson to answer the more technical side of it.

In 1995 we are talking about 4 percent of the vehicles in the nation. In 1997 it is 7 percent of the vehicles in the nation. One million cars is 1 million out of 16 million. So we are walking before we are running. We want to see how they work fully before the end of the decade when the Congress and the administration consider what to do next in the year 2000.

Senator LIEBERMAN. Although it will be 30 percent, presumably, of the cars that are sold in the affected areas.

Mr. ROSENBERG. That's correct. I would leave the question of the modeling to Dick Wilson.

Mr. WILSON. Two comments, Senator. First of all, there is no reason an alternative fuel car can't meet whatever nitrogen oxide tailpipe standard is necessary for any given area in the country.

Senator LIEBERMAN. No technical reason, right?

Mr. WILSON. No technical reason. So whatever nitrogen oxide standard was necessary from an air quality standpoint could be established. And, again, alternative fuels could——

Senator BAUCUS. Including round two?

Mr. WILSON. Including round two.

Senator BAUCUS. No question about it that it can be met?

Mr. WILSON. Well, the kind of numbers we're talking about, if you remember the chart Mr. Rosenberg showed, showed that alternative fuels can go well beyond the levels that you have for round two.

Senator BAUCUS. For gasoline? Can round two be met for gasoline?

Mr. WILSON. That's much more difficult if you are talking about conventional gasoline. It could probably meet in our certification test those levels of gasoline The biggest problem is assuring that conventional gasoline vehicles can meet those levels throughout their useful life.

Senator **Baucus**. I'm taking the Senator's time.

Senator **Lieberman**. That's okay.

Mr. **Wilson**. One of the big advantages of the new fuels—whether it is reformulated gasoline, methanol, ethanol, or CNG—is that they tend to be less reactive, so that when something goes wrong with the car in use—it is not perfectly maintained or something is broken on it—that fuel escaping is much less reactive. So, from an environmental standpoint, those things that tend to happen in the real world tend not to have the same dangerous environmental problems.

On the Northeast question, most of the modeling that was done on some of the alternative fuel benefits has been done looking at the Los Angeles, California, problems.

Senator **Baucus**. Right.

Mr. **Wilson**. Recently, as you probably know, we have been working with the Northeast States doing what are called Rom Net modeling, looking at the whole Northeast situation. The results we have from some preliminary runs appear to show that you're getting the same kinds of reductions in the Northeast as we were showing for California. In fact, we see the reductions all the way up. The question was: Does the lower reactivity of the fuels work close by where the vehicles are but end up reacting well upwind?

Senator **Lieberman**. Those are reductions in hydrocarbons. Does that modeling for the Northeast include the impact on the NO_X factor in our region?

Mr. **Wilson**. You can set whatever NO_X level you want for a tailpipe standard. We looked at a couple of different NO_X levels. But alternative fuels can meet whatever NO_X level you set. It is not a constraint.

Senator **Lieberman**. My time is up. Thank you.

Senator **Baucus**. Senator Jeffords.

Senator **Jeffords**. I will follow up a little bit on that. In previous hearings we discussed—and you indicated you had rather extensive authority in the reformulated gas area to move forward—S. 1630 reinforces that theory. I have a quick, easy question. Do you need more authority than you presently have or is presently in S. 1630, or are you pleased with what you have?

Mr. **Rosenberg**. We're kind of looking at the whole program going forward. There are many things in that bill that we might have authority to do that this is sort of like a plan on the part of the President and the Congress to kind of say what we will do. EPA has a lot of authority and a lot of responsibility.

We are, in fact, within 30 or 45 days of putting out an advanced notice of proposed rulemaking to raise questions relating to the aromatic content of gasoline, which is one thing that leads to reformulated gasoline. And so, under our existing authority, we intend to move forward, but the President, in his proposal, asked a more aggressive posture, and we're asking the Congress, as well.

We have no authority, however, to require the sale of cars that use reformulated gasoline absent this provision. So yes, it is very clear that we—and it was only in 1989 that the EPA and the current administration first decided to regulate the volatility of the fuel. It sounds ridiculous when you think about it that here it was the Congress and EPA just cranking down on the volatile organic compounds coming out of the back of the car, at the same time not regulating the volatility of the fuel going up. In fact, the evaporative losses were two thirds of the whole problem.

So we have become very attentive to the question of fuels in its full scope. We just issued a proposed rulemaking last week where we addressed the question of evaporative emissions on the cars.

So I think that even absent legislation we would do more than we have in the past, but we would welcome legislative support and the committee's support to push us in that direction.

Senator JEFFORDS. Thank you. Now, moving to the other end of the spectrum that I want to look at—no garbage in, no garbage out options—what is there in your plan or the legislation which in any way promotes, for instance, the use of hydrogen or the use of electricity? In particular, is there anything which would assign credits for their use? How should we try to bring forward these kinds of options which obviously end up with either nothing or just water as an end result?

Mr. ROSENBERG. I think, in a philosophical sense, we are at a crossroads here. We need to send a signal that cleaner fuels going forward is an important part of the equation. That will stimulate research and development in the more advanced technologies—electric cars and hydrogen.

But, in order to do that we have to see that where the technologies have been developed—in the reformulated gas and ethanol and methanol and CNG—that there is a stimulus to use those technologies. That will be the best stimulus for people to develop even newer ones in the future.

We really are at a crossroads to look at the problem as a whole in its totality, just as this committee looked at the acid rain problem in its whole. It said we want cleaner smokestacks. We want less tons of SO_2. And we will challenge the industries to figure out the most cost effective way using fuels or technology to do it.

The administration's thinking on the subject is the same. We want cleaner cars. We want cleaner air. And we want to challenge the two industries—the fuel industry and the auto industry—to do that going forward.

I think that with that challenge there will be more R&D and more incentives to do even things that are harder than the reformulation of the current technology on the car or the current technology on the fuels leading to electric cars and perhaps even hydrogen.

But it is the signal that will be given in 1990 that will develop that technology in the year 2000 and beyond.

Senator JEFFORDS. I guess the answer, though, to my question is that there is nothing in the bill that does anything other than making people look at those options.

What I am concerned about is that you have the incredible infrastructure built up in billions of dollars in the fossil fuel industry, billions of dollars in the automobile industry—which are totally oriented toward fossil fuel options or hydrocarbon options. It seems to me it is a little bit too hopeful to think that there is going to be much done to try to compete with those kinds of huge investments.

Mr. **Rosenberg**. It seems to me that the issue before the committee and the Congress today is to break the monopoly that exists today for conventional type of gasoline and open up the opportunity for new thinking in this area. You need to take the first step. How much further you want to go beyond this is certainly something for the committee to consider and for science and research to promulgate. Perhaps you want to direct us to do more research in some of these areas, and that is certainly one of the options.

But we are at the crossroads of opening it up for consideration of fuels as well as technology, and I think that will lead down the path to better fuels. We are very encouraged with General Motors' announcement the other day of an electric car. We were discouraged that they said, "Gee, here is an electric car, but you can't buy it." That's sort of like telling your kids, "Here is a piece of candy, but you can't have it."

We hope that they will start making those cars and using those cars, even in their own fleet, to demonstrate it. But there was only one car available. But that it positive, and we look forward to more positive results.

Senator **Jeffords**. I guess I had a specific part of that question on the credits assigned. Is there any credit assigned at all for an electric car, etc.?

Mr. **Rosenberg**. Well, in our case, assuming an electric car has no emissions, it would be three times the advantage of a car that got 30 percent reduction. We would provide that. And I believe in Senator Chafee's bill——

Senator **Jeffords**. Infinitely.

Mr. **Rosenberg**. In Senator Chafee's bill he has a provision. I think it is two times. I don't know if it is two or three. But I think it is a good idea to have the credit stimulate it somewhat. Even if it is a fleet purchase, the manufacturer should get credit in that particular location for a cleaner car. Again, I think it is very important in both Senator Chafee's proposal and ours—this concept of allowing the cities to opt in and opt up allows, once there is a demonstration of technology, for this to be an improving process from what we see today. That's why we want, in the year 2000, to provide the incentive for flexibility to increase the performance as these new technologies improve and as the cars are proven.

Senator **Jeffords**. Thank you, Mr. Chairman.

Senator **Baucus**. Thank you, Mr. Jeffords.

I have one quick question of Mr. Rosenberg. Who is to provide the consumer incentives if sales are sluggish? Should we mandate that the States provide the incentives—sales tax rebate, or whatever? What happens? Manufacturers offer the cars, nobody wants to buy them—for whatever reason. This is a pretty iffy proposition we're talking about.

Mr. **Rosenberg**. Well, we're not talking about cars that are any different from any other cars. We are talking about cars that can operate on conventional fuels and alternative fuels.

Senator **Baucus**. Maybe. Who knows?

Mr. **Rosenberg**. Well, they have the choice to go to the more radical solutions.

Senator Baucus. Let's take my premise. What if, whatever the cars—flexible, methanol, ethanol, natural gas, whatever—what if, for whatever reason—and I can think of many—people just aren't buying them? Who is responsible? Where does the liability lie? And, second, if we adopt the approach, what incentives should this Congress require of whom?

Mr. Rosenberg. The Congress has addressed this very issue in the CAFE law where it says that if a company seeks to sell a Lincoln Town Car, in order to do that it has to sell a few Escorts to offset it to get an average fuel economy. And there has been developed, since the 1970's, an effort and an opportunity within the car companies to kind of average these things out and to promote, whether it is using interest reductions or additional promotions for dealers or other promotions to sell these vehicles.

Senator Baucus. So the answer is that the responsibility is on the automobile industry, itself, to provide——

Mr. Rosenberg. The manufacturers.

Senator Baucus [continuing]. The rebates. The manufacturers?

Mr. Rosenberg. Correct.

Senator Baucus. By the rebates, through incentives, or whatever it takes.

Mr. Rosenberg. And the opportunity to make sure the car performs well and gets good mileage and works well and doesn't have a maintenance problem is also on their shoulders. If you bifurcate whose responsibility it is to make it acceptable to the consumer from who has to bear that burden, then you can really have a problem.

Senator Baucus. Which is to say we should change the law because in most States dealers are not required to take cars they do not themselves order.

Mr. Rosenberg. Well, I'm not requiring the dealers to order the cars. We are proposing that the automobile manufacturers have the responsibility to provide the incentives so that they will do it.

Senator Baucus. Dealers don't order them. They don't want them because they can't sell them. Then what?

Mr. Rosenberg. I think that then you have to reduce the price of the car. You have the same problem with CAFE standards.

Senator Baucus. So, again, the responsibility is on the manufacturer——

Mr. Rosenberg. That's correct.

Senator Baucus [continuing]. To reduce it so low that if the cars aren't wanted the dealers can finally find somebody to buy them because the price is so low.

Mr. Rosenberg. We think they'll perform very well. We think the public has indicated that they do want it.

My own judgment is that there are many people that would go out and buy a cleaner car because they want to be good citizens, just like they recycle their garbage, if the price was reasonable. They may not pay extraordinary amounts for that. But we do believe that the marketing of the cars and the marketing of the fuels is a responsibility of these industries within the context of the public policy established by the Congress.

Senator Baucus. Thank you.

Senator Chafee.

Senator CHAFEE. Nothing further.

Senator BAUCUS. Senator Lieberman.

Senator LIEBERMAN. Thank you, Mr. Chairman. I appreciate the line of questioning that you have raised because we have had some of the same concerns. Auto dealers, it seems to me, are understandably concerned that in an area like ours, where it is so easy to go next door to buy a nonalternative fuel car, that that will be an additional incentive to not buy them. But I think you answered the question. I'd be interested, obviously, in the response of the auto manufacturers, because the proposal seems to really put the major part of the burden on them.

Let me go, if I may, to another one of the practical questions that we have about how this would work. It seems that what you are saying—your testimony today is focused really more on the notion of a flexible fuel vehicle; that is, a vehicle that could use both the conventional gasoline and alternative fuel, and not one that is strictly alternative fuel.

Mr. ROSENBERG. Senator, that's only for the first phase. In fact, to get to our 80/90 vehicles—80 percent reduction in phase two—we would anticipate that had to be met with a dedicated vehicle that used a much cleaner fuel or a car that had a much cleaner tailpipe. It is a combination to get to that standard, but I guess it could be a flexible fuel vehicle. It really depends on what the technology is on the car.

We just wanted to be able to demonstrate that with current technology you can do phase one so you don't have this start-up problem, and then there is the challenge for future technology, and it may be on the car, and it may be on the fuels. But we would anticipate a substantial number of dedicated vehicles in the second phase and would hope that the fleet program in the first phase could be designed so that it would be ultra clean cars, as Senator Chafee talked about, that would demonstrate that technology—at least in a smaller population than the second phase.

Senator LIEBERMAN. That's important, and that's what I wanted to get at. To achieve the ends, you have the alternative fuel vehicle that is just the beginning, and we really have to move to the dedicated vehicles.

Let me ask you two practical questions that follow, in a way, on what the chairman has indicated. In that early period with the alternative fuel vehicles, the viability of that proposal in terms of its impact on air quality, it seems to me, is whether the alternative fuel will be competitively priced. In other words, it is possible that we could get people to buy these cars, but if gasoline is selling for a lot less than the alternative fuel then they are going to buy gasoline.

The Office of Technology Assessment very profoundly questions EPA's estimate that the alternative fuel pricing will be competitive. I think in some points it actually says that they would hardly call your assumptions best guesses. But what happens if your assumptions are not right and the alternative fuels are more expensive? Whose responsibility is it then—or is it anybody's?—to try to bring the prices into some competitive balance? I'm asking the same kind of questions that the chairman asked about the choice of cars. What about the choice of alternative fuels? Is it the States? Who is it? Taxpayers?

Mr. Rosenberg. Since we did some of these studies and since the OTA studies the oil industry, which is going to come before you—you might ask them—has been promoting the concept of reformulated gasoline like they're doing, to a degree, in California. So we now view that as a viable option. Gasoline prices, I guess, range typically 25 or 30 cents between the highest premium price and the average unleaded gasoline.

We're very comfortable that within those kinds of normal ranges of gasoline that our numbers are not incorrect. But if they are—which is your question—we are looking to the State implementation plan which ultimately, under the Clean Air Act, has the responsibility of achieving the goals and meeting these 3 and 4 percent improvements on an annual basis, to look at the problem and determine in each State what is the best way to proceed. Is it to have a sales requirement that sort of internally requires the different industries to reprice on a competitive basis so that this fuel sells? To adjust the gas tax? We're kind of leaving that issue to a State-by-State basis.

But we are encouraged that when you look at gasoline prices there is a 20 or 25 percent spread between high performance fuel and average fuel, and that we would expect that most of this fuel, whether it is principally alcohol or principally gasoline in the reformulated mode, would be on the high performance level.

Mr. Wilson. We think, Senator, the fuel industry has a lot of ability to promote particular fuels. A pretty high percentage of fuel sold now is premium gasoline, despite the fact that very few cars really require premium gasoline. I think with the onus on them, they'd be able to find ways to make sure that the fuel was attractive to the people who had cars that could use it.

Senator Lieberman. So there we are counting on the marketing ability of the oil industry plus the involuntary responsibility on the States to make it work.

I don't want to take too much more time, but let me just ask one more practical question. Let's say we get to that latter stage and people are buying dedicated vehicles in the affected areas. That presents some practical problems, too. Let's say that somebody in Connecticut buys a car that just uses alternative fuel, but decides that they want to get in the car and drive the family out to Montana——

Senator Baucus. Great idea.

Senator Lieberman [continuing]. Which is a great idea. We promote that in Connecticut as best we can. But there are no stations along the way except in some of the other areas that will sell the alternative fuel. What happens then?

Mr. Rosenberg. The present provision gives the EPA administrator the authority to require, in transportation corridors across the country, the availability of alternative fuels if, in fact, it appears that there are going to be dedicated cars on the road. That is very specifically addressed in our bill and in Senator Chafee's language, as well.

Senator Baucus. Wait a minute. What if, on the way to Montana, they want to drive down to visit Washington, DC, and then they want to drive over the Blue Ridge Mountains and perhaps down the Midwest some place—kind of weave their way around.

Mr. **Rosenberg**. We're saying that on the major highways the major gas stations would be obligated to carry this fuel. The same thing happened with unleaded gasoline.

Senator **Baucus**. You mean some dealer who is sitting out in the middle of—even though he is fairly large—in Wyoming or eastern Montana has got to carry this stuff?

Mr. **Wilson**. As you know, Senator, now there is a distribution network for diesel fuel, even though obviously very few of the cars in the country do it. You can get the fuel relatively simply. It is not quite as convenient as getting gasoline.

The idea of phasing the program was to wait a while before we had—we don't expect dedicated vehicles to be used outside of fleets for a number of years.

Senator **Baucus**. But don't forget a number of diesel trucks have much longer ranges. You have much shorter range with some of these fuels.

Mr. **Wilson**. Clearly, when we get to the point where you're going to have dedicated vehicles being used outside of these kind of centrally fueled fleets, you need to have a network of stations across the country to make it possible for people to get the fuel wherever they are, and that's why you probably want to get there later on. Furthermore, we think the technology may well advance to the point where you can have a flexible fuel, pure methanol, pure ethanol—obviously you now can do it with CNG vehicles—so you can maintain that flexibility for some time and still get the second tier kind of environmental benefit.

Senator **Lieberman**. Well, my time is up, but I hear the answer that it is going to be a real practical problem. I gather your answer is that EPA will order, through regulation, that there be this widespread availability of alternative fuels even outside the affected areas. I want to particularly wish you good luck in proposing that regulation to the cost effective group at OMB. I think that will be a great test of your advocacy.

Mr. **Rosenberg**. Well, we have been very successful lately, as you have seen, with OMB on our municipal waste incineration regulation and our evaporative loss. I would say the problem won't emerge, because unless the car companies feel that this is going to happen they will never be offering those cars in those areas because no one would buy it. So Dick is correct in believing that this will force the next generation of technology in flexible fuel vehicles that ought to be able to achieve these better results, or we'll work this out between the oil and the auto industries.

There is a lot that has to be worked out. We are at a crossroads. We've got ten years to work out the problems. We have tried for the last 20 years to clean up the air. This is a very difficult problem, but it requires EPA, the administration, the Congress, and the industries, together, to kind of solve the solution. If we can do this by putting the marker out there with a small percentage of the cars—not an insignificant, but not an overwhelming—and the fuels, we think we can solve that problem.

Senator **Lieberman**. Mr. Chairman, if I may just say finally, I agree with you and, again, I compliment you for trying to take the country in this direction. But it seems to me that these practical problems do suggest the importance of the basic point that the chairman made in his opening statement, which is that we need both an alternative fuels program and a second stage of the tailpipe standards.

Thank you.

Senator BAUCUS. Thank you, Senator.

I think implicit—in fact, explicit in your statement, Senator, is that it is important that we do meet these challenges and try to develop these alternatives because it is necessary, but it is also important that we don't gloss over them and don't gloss over the difficulties and the practical problems. If we're honest with ourselves, we do a service to this country if we meet the challenge of developing these other alternatives, but we also do it with both eyes wide open and with a clear head and a clear mind so that we can find the best possible solutions.

Senator CHAFEE. Mr. Chairman, I just want to make one comment, if I might, following up on this line of questions and statements.

It seems to me to start off with we've got a tremendous problem out there. Trying to clean up the air with the increased number of vehicles and the increased mileage that every vehicle runs is a tremendous problem. So there is clearly going to be some wrenching of the habits and the customs of American drivers, unquestionably. This thing isn't just going to be like sliding down a bannister, everything is going to be perfect. There are going to be difficulties.

Senator BAUCUS. There are going to be splinters.

Senator CHAFEE. I hope we can keep them to the minimum. But to suggest that everything is going to be hunky-dorey all the way and that nobody is going to have to change any customs or habits is, it seems to me, illusory. Therefore, we might as well recognize that. As the chairman said, we want to keep them to the minimum, but they are going to exist.

I have another brief statement. I think we've overlooked the cooperation that is going to have to exist between the automobile manufacturers and the oil industry. That has inevitably got to occur or we're not going to ever get to a solution.

Senator BAUCUS. Thank you very much.

Thank you, Mr. Rosenberg.

Mr. ROSENBERG. Thank you, Senator.

Senator BAUCUS. I might note for witnesses and members of the committee that three witnesses have already appeared and almost 2 hours has transpired. We have a good number left.

The next panel consists of: Mr. Tom Jorling, commissioner of the New York Department of Environmental Conservation in New York; and Mr. Tom Cackette, deputy executive officer of the California Air Resources Board.

I note, too, that Dr. James MacKenzie, who is a senior associate for World Resources Institute on the following panel, has to leave soon, so I'd like for him to come up on this panel, as well. I have to go with you first, Dr. MacKenzie, because I understand you have an 11:30 departure.

Mr. MacKenzie. Thank you very much, Mr. Chairman. I appreciate this, because I have a 12 o'clock engagement and it is going to be a little hard getting there.

Senator Baucus. How far away?

Mr. MacKenzie. The National Wildlife Federation. It's not too far.

STATEMENT OF JAMES MacKENZIE, SENIOR ASSOCIATE, WORLD RESOURCES INSTITUTE

Mr. MacKenzie. I am James MacKenzie. I am a senior associate with the World Resources Institute. It is a nonprofit policy research center in Washington.

The primary issue clearly here is clean air, and that's what we have heard about this morning. We've also heard that there is kind of a free market here in the options we are going to be choosing. However, I would suggest that over the time period that is being discussed here, this is not really the case at all.

We have fuels like ethanol which are not going to be available at any time in the kinds of amounts that would be available to supply a large number of vehicles. Ethanol is made from corn. The Corn Belt, if you believe any of the climate warming predictions, is going to be in trouble. Making ethanol is a very energy-intensive process. Ethanol in large quantities is not going to be available.

Nor, I think we would all agree, are electric or hydrogen vehicles, which I personally favor, going to be available in this time period.

This leaves two options, really: the methanol option, and some sort of reformulated gasoline in conventional vehicles.

Although the alternative fuels program is alleged to be fuel neutral, EPA, at any rate, is 100 percent in favor of methanol—if not institutionally, at least at the staff level. Not just M-85. They want to go to M-100 vehicles. We have heard from the previous speaker that the fuel would be nationally available. It would have to be nationally available if you are going to use pure methanol. And EPA also makes the argument that you're not going to get the clean air benefits that they hope for using M-85. You have to go to M-100 ultimately.

So I would say that you're really dealing here with two alternatives. It is going to be M-100 on the one case, maybe using M-85 to get there because of the infrastructure problems; and conventional gasoline, perhaps reformulated.

For a number of reasons I think going to methanol is a bad idea. First of all, it is not going to achieve major clean air benefits. I don't have to say that. EPA has said that. In their September document on methanol EPA estimates the potential clean air benefits of the President's program and concludes that by the year 2005 there will be a 1.5 reduction in ozone levels in the nine cities that they mentioned. They believe the reduction could go up to 3.3 percent by the year 2015.

The reasons for these small reductions are that conventional vehicles are getting increasingly cleaner; EPA believes transportation will be a smaller part of the problem; and other sources will become even more important.

In recent modeling of the Los Angeles ozone problem that was done for a conference held in Washington in December researchers concluded that the ozone levels from a 50-percent introduction of methanol vehicles would drop by 0.02 parts per million, and peak levels now are about 0.36 parts per million, so it is a very small reduction.

As we have heard both from Senator Baucus and Senator Chafee, OTA believes methanol is going to be a very expensive option, in terms of cost effectiveness, to reduce VOC's. And there are large uncertainties with those costs related to both the cost of the feed stock and the rate of return that would be required to build the methanol plants.

As a result of the expensive gas that is available in this country, there is no question that the methanol will be imported. And importing this methanol certainly won't improve our economic security. We spend about $45 billion a year importing fuel. This is not going to help that at all.

It is not going to help our national security, either. I think that as the world enters the 1990's, with negotiations on climate control treaties, we are going to see natural gas become a premium fuel everywhere in the world. It has the lowest carbon dioxide emissions and, of course, it has no sulfur oxides, either. So I really question whether we are going to be able to get the large amounts of methanol from the developing world in the scenarios where they are a reliable supply.

My biggest concern, however, is that there is a long-term commitment implied here to these alternative fossil fuels, and the global warming problem basically makes these approaches a dead end.

Methanol emits about the same amount of CO_2 per vehicle mile, as does gasoline. We have heard that vehicle miles traveled are projected to continue increasing, which means that a long-term commitment in either case, is not going to help that problem. And yet the climate office at EPA says we are going to have to reduce global emissions of carbon dioxide by 50 to 80 percent to stabilize the climate.

So my view is that these alternative fossil fuels are not the way to go, except perhaps in limited uses in buses and heavy duty trucks in some of these urban areas. Ultimately we should be taking a longer-term view toward our air pollution problems. I would separate this view into short- and long-term.

In the short term, I think there are plenty of things we can do that are in this bill that will reduce air pollution emissions: improved emissions standards, both evaporative and tailpipe; reformulated gasoline; stricter inspection and maintenance; a program that will get the older, polluting cars off the road. We know that most of the pollution comes from the older cars. They are owned by poorer people. There is a reluctance to put a financial burden on them, but I think that problem has to be addressed. Lastly, we need improvements in traffic, managements, because we've got to deal with the problem of vehicle miles traveled.

I would suggest that CNG is a cleaner fuel by the way, for the buses and trucks, but even here it has got to be a limited program.

Let me just finish by saying that the longer term solution has got to be the development of "emissionless" fuels. We've already heard that today—hydrogen and electric.

GM has announced on electric vehicle which has the needed performance. What we need now is better batteries. It is a research problem.

World Resources Institute released its report on hydrogen last fall. We had Senators driving it around the Hill. The problem, again, is a matter of reducing the costs.

I think those are important, long-term goals that we should be addressing as part of this program. This bill not only sets clean air policy; it is also an energy bill and it is a climate bill. Unless that is recognized, I'm afraid you are going to be back here having yet more hearings when those particular topics come up.

I'll just conclude by saying that I think that it is in the automobile industry's long-term interest to look toward these long-term options and to do the best we can over the next 10 or 15 years in dealing with pollution in a more conventional way, and using things like traffic controls as a means of avoiding the emissions in the first place and controlling greenhouse warming.

Senator BAUCUS. Thank you very much, Doctor.

Mr. Jorling.

STATEMENT OF HON. TOM JORLING, COMMISSIONER, NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Mr. JORLING. Thank you, Mr. Chairman and members of the committee.

Senator BAUCUS. Welcome back.

Mr. JORLING. It is, indeed, a pleasure to be back before the committee and appear before you on this important topic as you continue your efforts to amend the Clean Air Act.

I am appearing here on behalf of Governor Cuomo and the State of New York.

I have a prepared statement, Mr. Chairman, which I'd like to submit for the record and just summarize a few of the key points.

Mr. Chairman, this Nation needs—and my State needs—a nationally legislated, comprehensive automotive mobile source control program. Two basic elements must be included within that comprehensive program.

First, strict emission controls across the board in a two-phase program such as that included in your bill. It must be accompanied by warranty, useful life, recall, better certification, assembly line testing—the full range of things that make the automobile durable and clean.

The second component should be an alternative fuels program, and that is the subject of this hearing, and that's what I would like to speak to.

I'm also pleased to be here appearing on this panel with the acknowledged leader in this area, the State of California, the California Air Resources Board, Jim Boyd and Tom Cackette, who is here and, of course, Jim Lentz with the South Coast Air Quality District. Working very hard with them, we have come up with a New

York/California position for an alternative fuels program which we think will have the effects and the benefits that are necessary.

We think the program that we have proposed will maximize the introduction of the largest possible number of clean fueled cars into areas where they are needed—that is, the severe nonattainment areas—and do it within the framework of the Clean Air Act, its framework of federalism, the SIP process, all directed to achieve and maintain healthful air. That is the objective.

It also, I think, incorporates a broader perspective than that which we have heard, and that is that it must address all contaminants; that is, not just the ozone precursors, but NO_x and carbon monoxide, toxic pollutants, as well. And it also must be integrated with the fuel efficiency objectives that this Nation must be pursuing, and that is a minimum of a 42-mile-per-gallon car by the turn of the century.

Your inclusion of a CO_2 standard in your bill is a very important step in that regard, and I want to highlight that as very closely connected to these objectives.

Our analysis of the air quality program problems—and I think any and all analyses of the air quality problems—displays the dominant role of mobile sources.

In our case in the Northeastern corridor, 40 percent of the emissions that contribute to our ozone violation come from mobile sources. Another 40 percent come from upwind sources. A very substantial fraction of that 40 percent comes from mobile sources. One of the reasons that I would stress we need the phase two program as an essential program here is that vehicles don't stay in one place, nor does the air into which they emit pollutants stay in one place. So it is necessary to the great bulk of the automobile fleet that is going to continue to exist powered by conventional fuels that phase two be incorporated. I can't stress that emphatically enough.

Only 20 percent of the ozone precursor emissions that contribute to the New York Metropolitan Area Air Quality District—that's Northern New Jersey, parts of Connecticut, Long Island, Westchester County, as well as New York City—are subject to our control. We simply cannot achieve healthful air without this strong Federal program of mobile source control.

I was disturbed to read the statement that Senator Durenberger made at an earlier hearing in this committee about one of the intentions or motivations why the States are supporting a mobile source control program, and that is because we have not carried out programs of our own. I think that's wholly false, and any objective look at what has happened over the last decade would reveal that for the 8 years of the Reagan administration the Federal program has been stopped, and that stopping has had its greatest affect on removing any further responsibility and controls from mobile sources.

The States have continued—including Senator Durenberger's own State of Minnesota—to take the lead. Just earlier this week, at Governor Cuomo's direction, we filed, with our rulemaking process the notice bulletin in New York, our regulations to adopt the California emissions standards effective model year 1993.

Assistant Administrator Rosenberg talked about adopting revapor pressure regulations. The Northeastern States went to 9 pounds of revapor pressure; the Federal Government only went to 10.5 pounds. And that's in the face of the fact that the automobile is certified, according to 9-pound fuel, for performance and certification for manufacture and sale.

So it is absolutely essential that we have comprehensive mobile source controls, including the two-phase emission control program and an alternative fuel program, as well.

I want to touch just briefly on another issue that is very closely connected to these. The point was made earlier that there is a lot of authority in the current Clean Air Act—a lot of authority—which hasn't been implemented. We agree with that.

One of the things that we have done in the State of New York is file a petition with EPA under section 126 because we believe they have the authority to reach the upwind sources to the Northeastern corridor—that is, sources here in the District, Maryland, West Virginia, Virginia, and Ohio—that are contributing to our nonattainment problem. We have petitioned them to use that authority to act against those sources. They have, however, refused to use that authority.

They have, in fact, in a very recent letter written to me by Assistant Administrator Rosenberg, said that unless we can identify the sources that are specific and contributing to our air quality problem in New York, we have not met the burden of section 126. Mr. Chairman, that turns federalism on its head. We have no reach in New York to find out the sources here. There is no contest that 40 percent of that material moving into New York is causing our nonattainment problem coming from upwind sources, so that your section 186, with its minimum mandatory controls, must be enacted.

Even though we think they have the authority, they haven't exercised it. Your bill would remedy that by directly mandating them to do that.

So I think, Mr. Chairman, in summary, we need a comprehensive control program. Our backs are up against the wall. We have now added nine new counties in New York to nonattainment, and that's because the mobile sources continue to cause the problem. Unless this is addressed, we cannot produce healthful air for our citizens, and that's a fact that neither we in New York nor I think the Congress can tolerate.

Thank you, Mr. Chairman.

Senator Baucus. Thank you very much, Commissioner.

Mr. Cackette, we're glad to have you back again, too.

STATEMENT OF TOM CACKETTE, DEPUTY EXECUTIVE OFFICER, CALIFORNIA AIR RESOURCES BOARD, ACCOMPANIED BY ALAN LLOYD, CHIEF SCIENTIST, SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

Mr. Cackette. Thank you for inviting me to return today.

I'd like to introduce Doctor Alan Lloyd, who is the chief scientist of the South Coast Air Quality Management District. He is here today in support of my testimony.

I think you know we have a very serious air quality problem in most of the urban areas in California. I'm not sure if you did know, but it is a fact that more people are exposed to high levels of ozone in California than in all of the rest of the States combined. So when we look to the Clean Air Act we feel that if it is going to address public health problems, it must address the problems in California. And to effectively do that we think it should have three key provisions.

The first one is strong but fair nonattainment provisions, which is title one, that assures rapid progress towards attainment.

The second is strong, technology-forcing emission requirements for all categories of motor vehicles.

And the third is a program that requires the use of cleaner fuels in motor vehicles in the severe nonattainment areas of California and the country.

S. 1630 contains such strong emissions standards—the so-called second round of standards which go into effect in 2003. We believe these can be met in that time frame at a low cost. Therefore, California strongly supports these standards and urges their retention in the bill.

We also believe that the severe and extreme nonattainment areas of the country will need the additional emission reductions from alternative fuels or clean fuels, and that these reductions can be achieved most effectively using these alternative fuels.

To this end, the air quality and energy experts of California and New York have joined together to present a proposal for you for introducing a clean fuels element into S. 1630. The proposal is attached to my testimony.

Our proposal would have California move ahead with a clean fuels program in L.A.—sort of being the guinea pig or the demonstration area that Senator Lieberman requested—beginning with 150,000 vehicles in 1994, increasing to 400,000 vehicles in 1996. We believe this experience would provide valuable information to help the rest of the severe nonattainment areas throughout the country best decide how to introduce clean fuel vehicles which, under our proposal, would begin then in 1997.

Clean fuel vehicles would be defined as those vehicles whose emissions are twice as clean. That means they form half the ozone and are 50 percent or more less toxic as vehicles which would otherwise meet the emissions standards in S. 1630 in any given model year.

Thus, our recommended clean fuels program complements both tiers of the new vehicle emissions standards of S. 1630 and provides additional emissions reductions needed by those areas that have the especially difficult and long-term pollution problems.

States with severe ozone nonattainment areas would determine, under the SIP process, the exact number of vehicles needed to address their air quality needs and problems. EPA would require vehicle manufacturers to produce the number of clean fuel vehicles identified in the SIP process, and the fuel suppliers would be required to sell the clean fuels which these vehicles are designed to use.

To provide flexibility we would include a program of marketable credits in meeting these requirements which would benefit both the vehicle and fuel suppliers. In addition, the Sharp-Rockefeller bill of 1988 also provides important incentives to vehicle manufacturers who produce these vehicles.

You may be aware that last month the Air Resources Board took the first step towards adopting a regulation which would require the introduction of low emitting and ultra low emitting vehicles in Los Angeles beginning in 1994. I think you may find it interesting that our proposed regulation, which will likely result in the use of clean fuels, received considerable support from both public and private sectors, including some of the oil companies in California.

One of the reasons that this occurred was because of a long study that we had, the one referred to by Senator Wilson called the Advisory Board on Air Quality and Fuels, which included members of the oil industry, auto industry, private sector, public sector, and government. This advisory board which conducted this study relied on an extensive record that they collected from experts all over the world. It included California's experience with 25 million miles of clean fuel vehicle operation.

Based on this record, and after public hearings, this advisory board concluded that clean fuels would be needed in California to meet air quality standards, that they were feasible, that they were cost effective, and, as a result, they recommended to the Air Resources Board that we go ahead and adopt the regulations which I referred to just a minute ago. We have had a number of public workshops and hearings and we are on schedule to present it to our board in September of 1990.

We urge you to look at the findings of this advisory board as additional support for including a clean fuels program in S. 1630.

In closing, I would like to return for a moment to my first point, which was the need for strong and fair nonattainment provisions in title one of the act. We have submitted to the committee staff several amendments which would provide the essential flexibility that we need to attain the air quality standards, and the details are in my testimony. I would just urge you to please give those amendments consideration so that we can be fully in support of S. 1630.

Thank you, again, for the opportunity to speak.

Senator BAUCUS. Thank you very much, Mr. Cackette.

Dr. MacKenzie, you have to leave fairly quickly so I have a question for you. What do you think are the global warming implications for methanol use? You mentioned you felt that this was not, in fact, a marketplace proposal but, in fact, is, for all intents and purposes, a methanol proposal. That was your view.

Mr. MACKENZIE. Yes.

Senator BAUCUS. So what are the global warming implications of that, if it comes to pass?

Mr. MACKENZIE. It depends, Senator, on the size of the program. A tiny program has little significance. My concern is that we are at the crossroads that Mr. Rosenberg spoke to, and that we may go from reliance on conventional crude oil to a large-scale reliance on another fossil fuel with exactly the same CO_2 implications.

The U.S. CO_2 emissions from transportation are larger, by themselves, than all of those of South America, Africa, West Germany, the United Kingdom, Japan. We have a major responsibility to develop the technologies that are going to let not only us but the developing countries deal with the global warming problem. As it stands, it is going into a large-scale program that is not going to get the job done.

Senator BAUCUS. Thank you very much.

I'd like to ask you, Mr. Cackette—and also Mr. Jorling—on page 4 of the statement of Administrator Rosenberg he said:

> With gasoline vehicle emission controls becoming very expensive and approaching the technological limits, there are only two basic options. The first is to restrict automobile use, and second is cleaner fuels.

He seems to reject round two. I'd like your reaction to that statement.

Mr. CACKETTE. I cannot support that statement. I think that in 15 years or so that I've been involved in automotive emission control I've never seen a larger menu of technological opportunities available for further reducing conventional gasoline car emissions. The menu is great because of the electronics and innovation that is occurring. You see things like this General Motors electric vehicle that just a few weeks ago people would have said—and Dr. MacKenzie is saying is far off in the future. And yet they show a vehicle that looks very appealing for use in commuting. It's stylish. It has got air conditioning, heating, performance—all of these factors.

I think those kind of opportunities are very real, and so for both in the alternative fuel area and gasoline vehicles we are going to see big, big improvements.

Two years ago I would have not been certain that tier two standards would have been feasible. Today I'm real certain of it, and I'm very confident of it at a low cost. We see vehicles being produced today that can meet those standards, and yet your standards don't go into effect for 13 years.

Senator BAUCUS. Mr. Jorling, is round two needed for the Northeast?

Mr. JORLING. I share that view. To anticipate a failure of achieving something in 13 years is, in my judgment, not very worthy of our sense of what we can achieve with technology in this area.

But I would add another point. In the States we don't have a choice of making various kinds of tradeoffs such as those two that were suggested. We would only have had the option then of controlling other things within our jurisdiction to produce healthful air. We would have to ban lawn mowers and outboard engines—4,000 tons of VOCs. Hair sprays in the metropolitan area would be banned, and we would achieve 2,900 tons of reduction. Ban styling mousse and we'd get 227 tons. We would ban all personal deodorants and we could get 700 tons of reduction. We would ban all-purpose cleaners and we'd get 2,500 tons. And we would ban all room deodorants and disinfections and get another 1,700 tons.

When you add up everything that we can do, we can get 27,000 tons of removal. That compares to automotive sources which contribute 157,000 tons. That's where cost-effective solutions are going to be produced to get healthful air. It is with mobile sources.

It is silly to suggest that we should undertake that kind of a program, yet that's what we have left to us if the automotive sources are not controlled.

Senator **Baucus**. I'm a little bit confused as to why these cleaner fuel proposals call for the reduction of hydrocarbons and toxics but not NO_X. Why is that?

Mr. **Cackette**. Well, for one, the two tier standards that you have in your bill will require very stringent and strong reductions in NO_X.

Senator **Baucus**. But also hydrocarbons.

Mr. **Cackette**. Yes. And also hydrocarbons. But the NO_X standard right now is 1.0, and you propose to go to 0.2. That's an 80 percent reduction that I think forces technology quite a long way. But that indicates the importance of tying the two together. If you only go with an alternative fuels program you don't achieve very much NO_X reduction. If you go with both, you get NO_X and hydrocarbon reduction—therefore, the benefit of tying them together.

Senator **Baucus**. You two are pioneers compared to other parts of the country in this area. What is wrong with Dr. MacKenzie's basic statement that why should we waste our time developing this big fossil fuel infrastructure and all these proposals, including cleaner fuels, assumes fossil fuels, essentially. So why not just set much tighter standards—say a clean car by the year 2010—and let's get on with it. We're wasting our time, according to Dr. MacKenzie. What is your reaction to that?

Mr. **Cackette**. What's wrong with it is that we have tens of millions of people in California that are breathing dirty air today. And while I totally support his goal of having near zero emission vehicles in the early 21st century, we need to do what we can do today to get there. If the implication is to wait until these hydrogen and electric vehicle technologies come by, then we're not going to make any progress for the next 10 years.

Senator **Baucus**. Chances of that, Dr. MacKenzie?

Mr. **MacKenzie**. I certainly don't say we should do nothing. I think I have stated the whole range of short-term options that we are dealing with that you can do—reformulated gasoline, reduced vapor pressure, and so on and so on and so on. What I'm saying is that the best evidence I have seen indicates a horse race between conventional fuels and these alternative fuels. However, you have to make heroic assumptions about the reductions in formaldehyde for major clean air benefits from methanol cars for example. And current M-85 cars do not meet California standards for formaldehyde.

Senator **Baucus**. How do we do both? How do we take care of the current smog in Los Angeles and, at the same time, set in place clean vehicles?

Mr. **MacKenzie**. I have seen nothing that shows you can reach the standard in California for many decades, and I think that they would probably agree with that. They are all talking about making progress and achieving cleaner air, but California is three times the standard. I don't think you are going to be able to do anything.

Senator **Baucus**. Is it clear, Mr. Cackette, that L.A. can meet attainment by the year 2010?

Mr. **Cackette**. We have a plan in place to do that. It requires some pretty far-reaching assumptions. But we don't place the emphasis as heavily on attainment as we do on trying to make an improvement to air quality today when the pollution is so high it has the worst health effects and affects the most people.

Quite frankly, I'll be happy to see that we have cut the pollution levels by one-half to two-thirds, even if we don't get to attainment by that date. Our objective is attainment, however.

Senator BAUCUS. You seem to be agreeing somewhat with Dr. MacKenzie, though, that you're not so certain you can reach it given present technology or given the basic construct of S. 1630 in addition to what California is doing.

Mr. CACKETTE. I think that's the issue. The issue is what we can do to get the levels down so that the health effects are mitigated. If we were to get from our 0.35—three times the standard—to 0.18, which is typical of some of the areas today, we would reduce the number of people exposed by millions and the number of days that they are exposed by 50 percent or more, and the severity of the health effects that they are exposed to would be reduced.

Senator BAUCUS. The implication of your statement is that without round two you'd be much less.

Mr. CACKETTE. We need round two. And to address the question of what we are doing to look at the long-term, both Senator Chafee's proposal and our proposal include an element to get these ultra low emission vehicles. In our program in California we are going to require the production of a small number of ultra clean vehicles like electrics starting in 1995.

Mr. JORLING. Mr. Chairman, if I could just add to that, I think one of the key factors here is that we need to make progress and we need to make progress under a program that has compulsion—reasonable compulsion—in order to force technology. That has been the experience of the Clean Air Act. If you set these goals, you move toward them, then creativity comes into play and we move.

If we said now that we knew what the 2005 objective would be and we should move directly to that and avoid these incremental gains, we would not get to 2005. So we have to make progress.

Those of us that are in the business—as Tom and I are—of trying to make progress to assure the maximum protection to the public health of our people, feel that we can do these things. We can make progress. We don't have a hand-wringing attitude. But we need help from the Federal Government on this very dominant role of mobile sources.

Senator BAUCUS. Senator Chafee.

Senator CHAFEE. Mr. Chairman, since Doctor MacKenzie has to go very shortly, I don't have a question for him except I agree with your concerns on CO_2 and the greenhouse effect in the future.

Perhaps if Senator Lieberman wanted to ask a question of Dr. MacKenzie, I'd be glad to yield.

Senator LIEBERMAN. Thank you very much, Senator Chafee. I have two quick questions.

I appreciate your basic point that you don't want us to get sidetracked on the alternative fuels program and forget about the long-term solution, which is a totally clean car. But am I hearing you correctly that you believe that the package of alternative measures that you have suggested—better inspection and maintenance and kinds of programs to get older cars off the road—would achieve as much of a reduction in smog, ozone, as the various alternative fuels programs that are being recommended?

Mr. MacKenzie. No, Senator. What I would suggest is that if you take this whole package and then add one element, in the one case it would be these alternative fuel vehicles, and in the other case it would be perhaps conventional cars with tighter standards and lower vapor pressure and reduced toxins, then, from what I can see, you're basically in the same region of pollution reduction.

Senator Lieberman. So what do you mean when you say the entire package?

Mr. MacKenzie. I think we need to do much more than alternative fuels—this has become the moral equivalent of cold fusion—the magic bullet that is going to save us from air pollution. If only we change fuels, it will do the job. And I believe this is not the case at all.

We are experiencing rapid growth in vehicle miles traveled, and we're going to have to do a lot of things. Why work on the margin, on cars that are already clean, when 80 percent of the pollution is coming from the older cars? You can't ignore those. So I think an integrated program is required, though I cannot say exactly how for it is going to take us. I think we must do everything that we can that is consistent with long-term goals. That is what I am saying.

Senator Lieberman. My second question is: how close are we—project, if you can, in years—to the general availability of a totally clean car, an electric car? And then, if you were drafting the bill that we are working on now, what would you put in the bill to bring that date to an earlier time?

Mr. MacKenzie. I think that the only thing standing between us and electric vehicles are better batteries, frankly. I think GM probably would say that, as well. They're trying to double the life of the lead acid batteries, which are primitive compared with what we need in the longer term. And I think that's a subject that requires research and development.

Hydrogen is primarily a matter of cost. It needs basic applied research and perhaps cooperative research between the Federal Government and industry.

My own view is that these things are best brought into existence through purchase programs, frankly. The Federal Government agrees to purchase and subsidizes State governments to purchase vehicles that will achieve certain performance goals. In this way the auto industry will want to make them.

Senator Lieberman. So that's what you would put in the bill if you were writing the bill at this point?

Mr. MacKenzie. Well——

Senator Lieberman. Failing that, how far away are we in years from a generally available electric car, in your opinion?

Mr. MacKenzie. I don't know the answer to that because I'm not familiar enough with the battery technology. I think GM said that they thought within five years they could have it. I just don't know the answer.

Senator Lieberman. Thank you.

Thank you, Senator Chafee.

Senator Chafee. Thank you. I just want to say to Dr. MacKenzie that the electric car is great, but you have somehow got to get the energy to recharge the batteries and that's another whole new problem.

Mr. MacKenzie. May I make a comment on that? I have calculated that CO_2 emissions from electric vehicles would be reduced between 15 and 50 depending on the fossil fuel mix.

On the longer term, we've got to go to solar renewable resources, which would have no carbon at all.

Senator Chafee. Thank you.

Senator Baucus. Thank you very much, Doctor.

Senator Chafee. I'd like to ask Mr. Cackette a question. Could you talk a little bit now about your second tier proposal in California. As I understand it, the staff has come up with this idea, but it hasn't been adopted yet. Am I correct on that?

Mr. Cackette. Yes. We have developed a proposal for a clean fuels program in California. It differs from the one that we are recommending to you for the Senate bill. We have taken the conceptual outline of it to our board for basic approval on whether we should go forward and develop that, and they said yes.

Senator Chafee. I was talking about tailpipe emissions, though.

Mr. Cackette. Our standard relies on tailpipe emissions. It does not specify clean fuels. It says, "Adopt in 1997 a hydrocarbon standard of 0.075 grams per mile and in the year starting around the turn of the century a phase in of vehicles that are as clean as 0.04 grams per mile of hydrocarbons." We think that will require some use of alternative fuels in order to meet those standards.

Senator Chafee. Mr. Jorling, judging from your testimony you support my provision on alternative fuels although you want 50/50 and I would go to 40/50 on performance standards. So you would be tougher than I would.

Mr. Jorling. I think the two proposals have come quite close together. I think there is still some uncertainty as to the component of a phase two standard that would apply to all vehicles sold in this country in your proposal. We believe that that phase two requirement that is currently in S. 1630 is fundamental to achievement of our overall air quality objectives. If your proposal includes that component, then I think we are very close.

Senator Chafee. You, yourself, in New York City, as I understand it, are adopting alternative fuels. You are proposing that, aren't you?

Mr. Jorling. Well, in this program we have set out— let me step back. I think we are giving credit to the administration for coming forward with a mandatory alternative fuels program. I think they deserve great credit for that. Otherwise, we would be just limping along trying to buy four buses here and two taxicabs there.

What we are trying to achieve here is to make a program which will produce a significant number of vehicles that will achieve air quality objectives—not just demonstrate the technology, but achieve the air quality objectives—build upon what we have in place; namely, build on the California experience, allow us to evaluate that experience, look at the different fuel technology mixes that are available. We suspect that there will be much more compressed natural gas used in the Northeast.

Allow us to figure out in our State implementation plan program that we're going to be pursuing under these new amendments, come in with a program to EPA that will assure that 30 percent of the vehicles sold in our areas beginning in 1996 will be alternative fuel, as defined in our proposal, tied to phase one and two standards, and that EPA can then use its Federal authority to assure that both the fuel and the technology choices that are made in that State implementation plan are realized.

They will work with the manufacturers of both vehicles and fuels to assure that what we have included in our State implementation plan will be satisfied.

We have attempted to integrate it, therefore, into the State implementation plan, federalism program of the Clean Air Act, and to do it in a meaningful time that presses technology but does not act unreasonably with respect to technology.

Senator CHAFEE. What do you say to the concerns that were voiced from here about the person who is driving from New York to Montana?

Mr. JORLING. I think those are very serious problems. And I think one of the reasons that we have tempered our incursion or insertion into the number of vehicles in our areas is, in part, in anticipation of that. Some of it will be accommodated by mandatory fuel distribution systems under Federal law, but I don't think that is an adequate answer. I think there will be hardship.

My own suspicion is that if I project this out now—we're talking eight or nine years into the future—that a family that is going to go from New York or Connecticut or Massachusetts to Montana will, in all likelihood, rent a car. They will not use their own vehicle that they use for their own personal use in their own communities.

Senator CHAFEE. That's a new element tossed in here.

Just off the top of your head, do you have any statistic that might indicate what percentage of all the automobiles in California and New York could be listed as fleet vehicles? Is it a significant percentage?

Mr. CACKETTE. It is relatively small. I believe the numbers I have seen range from 8 percent to 12 percent, or something in that range, that are fleet vehicles. In New York City I would imagine it is somewhat higher because of taxicabs.

Senator CHAFEE. I'm just curious. Is that roughly right at 12 percent?

Mr. JORLING. We will supply an accurate number for you, Senator Chafee, but I believe that our figures, notwithstanding what intuition would suggest with the number of taxicabs, about the same throughout the air quality district that is the New York metropolitan area.

Senator CHAFEE. Thank you both very much.

Senator LIEBERMAN. Thank you, Mr. Chairman.

Senator BAUCUS. Mr. Lieberman.

Senator LIEBERMAN. Mr. Jorling, in your support of this proposal you seem to be alone among the NESCAUM States. I just wanted to clarify whether that is true. Why don't you clarify whether it is true. Are you the only State that has come forward to join this proposal?

Mr. JORLING. No. It is not true, Senator. What we have had is a problem of timing in getting through the NESCAUM States full agreement with the proposal that we had worked out with California and New York. But I can say this: it is fully consistent with the principals that NESCAUM has articulated, and also are substantially consistent with the principals of the National Governors 'Association position on this.

The concerns that the NESCAUM States had earlier raised about testing and efficacy, those things are addressed in our proposal so that we do have an opportunity to evaluate performance, evaluate durability, those kinds of things, before we make our choices as part of our State implementation plan.

So I think that I have enunciated the principals that NESCAUM has already agreed to in the prepared remarks, and I suspect that, given a little bit more time, at least most—and I think all—of the industrialized, highly-populated Northeastern States will subscribe to this position.

Senator LIEBERMAN. That would obviously be significant. I presume, therefore, that some of the concerns that the other Northeastern States expressed that I talked about earlier about the initial proposal from the administration, at least in your mind, are satisfied by this proposal?

Mr. JORLING. That's correct, Senator.

Senator LIEBERMAN. Let me go briefly then to one other question. In his testimony, Mr. Rosenberg suggested that the States should play the major—perhaps exclusive—role in guaranteeing competitive pricing of the cleaner fuels. What is your reaction to that?

Mr. JORLING. I don't think that is possible. Most of the fuels are produced in a very interstate commerce kind of market, and for any single State to influence the pricing structure of that seems to me to be at least not a very cost effective regulatory structure. So I don't think we have the tools or the devices.

That's why in our proposal we submit, as part of our State implementation plan, what our choices are on alternative fuels to meet the 30-percent mandate in the 1996–97 period. EPA has to evaluate that. If they approve it, then they must use Federal authority to effect change in the interstate commerce areas; namely, with the manufacturers of both vehicles and fuels. That's the appropriate use of Federal authority versus State authority. We identify what we can achieve; they must then work with the interstate commerce aspects to achieve the realization of that.

Senator LIEBERMAN. So you would deal with the concern about the possible higher price of the cleaner fuels by asking the Federal Government to put the responsibility on the producers—the petroleum industry—to do something to competitively price those alternatives?

Mr. JORLING. I think that is correct, and it has to be that way, given the interstate nature of the movement of vehicles and the manufacture of vehicles and the distribution of fuel.

Senator LIEBERMAN. Do you agree with the concern expressed in the Office of Technology Assessment report that, in fact, cleaner fuels might well be significantly more costly than gasoline?

Mr. JORLING. I think some of them could be. Others of them I think, depending upon what changes are made in the distribution of natural gas throughout North America, could be substantially less. So I think that part of the projection of what costs are going to be incurred is going to be a function of your law. If you say these things should be done, that will affect price more than anything of cajolery. Then we'll see how the marketplace responds to that clear, unequivocal statement of public policy. If the past is any guide—which I think it is—we will see, instead of the $1,200 projections of compliance with the 1970 Clean Air Act per car in 1976, in fact, it drops down to a couple of hundred dollars or even less. If you are firm, you speak unequivocally, it will affect price more than anything that any of us can say in anticipation of that statement of public policy.

Senator LIEBERMAN. Okay. Again, I commend the two of you for the real active leadership here. I particularly wish you well, Mr. Jorling, in trying to convince the other Northeastern States to join you in this.

Thank you.

Senator BAUCUS. Mr. Jorling, I have a couple of quick questions here. In your statement first you applaud the administration and, by implication, Senator Chafee for his efforts in trying to find a clean fuels alternative, but yet you say there are concerns. If I can quote you, in your statement you say, on page two,

> First, there is not yet sufficient data to conclude that over the useful life vehicles powered by some clean fuels, especially the alcohol fuels, will actually emit less toxic and ozone-forming compounds, or whether the vehicles will perform at required levels for 10 years or 100,000 miles.

Could you expand on that? What are those concerns?

Mr. JORLING. Those are concerns with especially some of the fuels. I think if we could assume compressed natural gas, many of those concerns disappear.

Senator BAUCUS. Right.

Mr. JORLING. But certainly with some of the alcohol fuels, oxygenated fuels, we need a period of close evaluation of the performance and durability of those vehicles.

Senator BAUCUS. How do you recommend we get that period of close evaluation?

Mr. JORLING. The proposal basically says here that California is prepared to do that, and they are to do it in a much earlier time frame under their own program. They need some assistance from Federal law, I think, in achieving that. But we need to use that opportunity to evaluate these different mixes' performance and then we can evaluate that in our State implementation plan review process and make choices based on that information.

Senator BAUCUS. Then are you saying that perhaps California should be the demonstration program? That is, the Federal alternative fuels program should essentially contemplate California as the national demonstration program before we in the Congress fairly aggressively go further in mandating a national plan?

Mr. JORLING. I think I'll let Tom speak to what the situation in California is. California is a leader in clean air objectives and programs for the obvious reason: the air is exceedingly dirty, and it is very dirty because of the automotive sources.

They have been searching out every possible avenue to bring their air quality to healthful standards. They are prepared to do these things. They have the kind of program. When I send my people out to the State of California and they examine the character of the air quality program out there, they are overwhelmed. There are 700 people, I think, that serve in that program. That compares to a couple of hundred in New York covering our entire State. So they have much more analytical equipment, they have much more testing facility, and they have much better air quality diffusion modeling for their various regions. So it is an appropriate test.

They also have a lot of fuel producers in California that can satisfy this.

Senator BAUCUS. So why shouldn't California be the demonstration project?

Mr. JORLING. What we are proposing, in effect, is for that to happen.

Senator BAUCUS. Then why not a provision in S. 1630 which essentially provides for that rather than a national plan for other cities?

Mr. JORLING. I think it comes to the fact that they need help from Congress, from the national Government, in achieving the number of vehicles that they need there, and they need it to also help offset some of the price differentials that will occur, and they also need it—we need it because without that sort of next phasing, people aren't going to take seriously the market impacts.

Senator BAUCUS. I'm really trying to get at your concern, which is insufficient data to really know what is going to work or not work here.

Mr. CACKETTE. I think you have to recognize that we're not just at the beginning of a "demonstration program." We have driven cars in fleet operation over 100,000 miles now.

Senator BAUCUS. But that's about 600 cars.

Mr. CACKETTE. About 600. And we have 5,000——

Senator BAUCUS. Those aren't production cars.

Mr. CACKETTE. No, but we have 5,000 on order that will be delivered in the next 2 years. We are prepared to go ahead with hundreds of thousands of vehicles under our proposal. The reason that we are prepared to do that is that we feel absolutely confident that this demonstration program will be successful. It won't fail. What it will do for the rest of the Nation is work out the bugs and provide an information base to let States and officials who have not had the opportunity that we have had to be comfortable with these early vehicles to get comfortable with them.

Senator BAUCUS. Do you agree with Dr. MacKenzie that these clean fuels programs are essentially not marketplace but essentially methanol programs?

Mr. CACKETTE. Not at all. I don't think they are methanol programs. I would say right now the most likely clean alternative fuel that you will see in the 1990's, if the proposals that Senator Chafee or we are putting forward, will be reformulated gasoline. That is likely to be the leader.

I would point out to Mr. MacKenzie, however, that it is likely to increase CO_2 emissions. So, relying on that as his basis for——

Senator BAUCUS. You think the basic alternative is going to be reformulated gasoline?

Mr. CACKETTE. Along with better emissions controls. That combination can allow the first phase of clean fuel requirements that we have defined in our proposal to be met by many vehicles.

Senator BAUCUS. Why do you think that the winner or the one that is at the head of the pack will be reformulated gasoline? What explains that?

Mr. CACKETTE. First of all, we have done little to improve gasoline. In fact, gasoline has gotten worse from an air quality standpoint over the last 10 years. I think, therefore, it offers a very large opportunity to be made cleaner. Second of all, it works with existing emission controls and it can work on existing vehicles and it doesn't require major infrastructure changes. That sort of points to a path of least resistance for implementing that choice.

In the early years we may see more of the alternative fuels in the fleets because those are more ready than reformulated gasoline is. In the later years—in the 2003 second round standards—we may see more of the alternative fuels—in particular, electricity—coming on board as a feasible——

Senator BAUCUS. If we're going there, why are we wasting our time? Why not just have more incentives to get reformulated gasoline, get the refining capacity up, and get on with it?

Mr. CACKETTE. Because I don't think that reformulated gasoline will be able to go all the way. I think it will be good for this first step, the 1990's, but beyond that it will have to be more than reformulated gasoline. And because in the future—Senator Jeffords talked about the need to look at hydrogen and the need to look at electric vehicles. They're not going to necessarily just be battery vehicles. The fuel cell, for example, is a technology that can double efficiency, halve CO_2 emissions. It is going to require a simple fuel, not gasoline, to operate.

Senator BAUCUS. Thank you.

Senator CHAFEE. One quick question, Mr. Cackette. Do you see some changes in your useful life requirements extending beyond 5 and 50,000?

Mr. CACKETTE. We've already adopted 100,000 miles for cars, and we already have 120,000 for light trucks.

Senator CHAFEE. I hadn't realized. Have you gone to 10 years and 100,000 on that?

Mr. CACKETTE. Yes.

Senator CHAFEE. You've already adopted that?

Mr. CACKETTE. Adopted it for 1993 and later models.

Mr. JORLING. And that's what we propose to adopt with our rulemaking package now for the same model year.

Senator CHAFEE. Thank you.

Mr. JORLING. Mr. Chairman, if I could just answer that question about why the reformulated fuels, one of the things that has happened is that the petroleum industry has begun to see the emergence of this public policy. They see the threat that is presented by alternative fuels, and so they are allowing their creative genius to come up with reformulated fuels. It is an example, in my judgment, of the success of technology forcing. I think there was great coincidence about the ARCO announcement in Southern California of reformulated gasoline to the emergent concerns that they have over what is going to be in this Clean Air Act. So it is an example of successful technology forcing.

Senator Baucus. That applied primarily to leaded gas though, didn't it? That's leaded gas. You're saying reformulated gasoline can also meet the round two?

Mr. Jorling. The clean fuel that they have introduced now in the California market.

Mr. Cackette. I think that fuel is a cleaner fuel. It would probably need more reformulation to qualify as a clean fuel under the kind of proposals that we need. But they have committed publicly to reformulate in a similar manner to EC1 their other fuels. So I think they're making progress.

Senator Baucus. Senator Lieberman.

Senator Lieberman. Just a quick point of clarification on one of the questions that the chairman just asked. If we are seeing the first—this is about your proposal—the first stage in California as essentially a demonstration, but, nonetheless, for the reasons you have stated the proposal would also go on to require a more national program, is there a cut off point if the demonstration fails in your proposal? What happens if it doesn't work in California?

Mr. Cackette. I think my answer earlier is that we're confident that it will. But let's say that it doesn't work. That information will become available, and we could come back to Congress or, just in case, we have an opt out provision. Opt out could be used as a way of saying it will not benefit attainment of air quality standards, so a State could opt out.

Senator Lieberman. Do you have an opt out provision in your proposal now?

Mr. Cackette. Yes, we do.

Senator Lieberman. I see. Thank you.

Senator Baucus. Thank you very much.

Our next panel consists of: Mr. Donald Buist, director of automotive emissions and fuel economy with Ford Motor Co.; Mr. James Fitzpatrick, who is vice president for marketing and product planning for General Motors; and Mr. Harold Idell, senior manager for vehicle engineering and planning for Federal Express.

Mr. Buist, you are first.

STATEMENT OF DONALD R. BUIST, DIRECTOR, AUTOMOTIVE EMISSIONS AND FUEL ECONOMY, FORD MOTOR CO.

Mr. Buist. Good morning, Mr. Chairman, and members of the committee.

Thank you for the opportunity to present Ford Motor Co.'s views on the automotive legislative proposals before this committee.

The draft alternative fuel proposal circulated by the committee in its letter of invitation would require manufacturers to produce a specified number of clean fuel vehicles that would be sold in the nine worse ozone nonattainment areas.

Beginning in 1997, the second phase of ultra clean fuel vehicles would be mandated for centrally fueled and maintained fleets in all extreme or severe nonattainment areas.

Ford has several serious concerns with the draft proposal.

First, with respect to production mandates, from a practical standpoint production mandates are not really much different than sales mandates because the cost of production ultimately will have to be recovered through vehicle sales. Consumers are understandably wary of new technology like alternative fuels and no one can predict how many of these vehicles will be sold. Therefore, it would be most unfair to require manufacturers to assure a specific sales or production volume because manufacturers cannot force consumers to purchase their products.

If Congress decides that alternative fuel vehicles should be part of the clean air bill, local governments should be required to provide vehicle and fuel incentives to stimulate consumer demand, and manufacturers should be held responsible for being ready to satisfy the demand.

Our second concern is the ultra clean vehicle requirement. Such vehicles would have to emit 80 percent fewer volatile organic compounds than proposed in first-year emissions standards in S. 1630. In addition, toxic emissions for ultra clean vehicles would have to be reduced by 90 percent. There simply is no known vehicle or fuel technology capable of achieving the proposed performance standards for ultra clean vehicles.

Some alternative fuel vehicle technologies have the potential to meet the standard for VOC emissions, but they may not be able to achieve other tailpipe emissions standards and proposed reductions for toxins.

Finally, the retention of second tier tailpipe standards continues to concern us. Manufacturers have testified, and government experts agree, that there is no present technology, nor do they know when technology would be available to achieve the second tier levels. If Congress decides to include an alternative fuels vehicle program in the clean air bill, it should be in lieu of a second tier of tailpipe emissions standards.

Despite our concerns with the proposed approach, we continue to believe that a workable alternative fuels program is the most promising approach to further reduce auto emissions in the worse ozone nonattainment areas. We also believe there are several concepts key to facilitating a successful transition to alternative fuel vehicles.

First, we shouldn't try to make up our mind today on which fuel is the fuel of choice for tomorrow's vehicles.

Second, there needs to be a centralized public fact finding by EPA that assures that we have the most complete answers possible to questions of alternative fuels improvement, impacts on health and global warming, and fuel availability.

Third, consumers are likely to need incentives to purchase alternative fuels and alternative fuel vehicles.

Fourth, manufacturers should have the responsibility to put the capability in place to produce alternative fuel vehicles in volumes to support customer demand in nonattainment areas.

Fifth, widespread availability of alternative fuels is critical to developing consumer demand and achieving the desired air quality benefits.

Last, flexible fuel vehicles are the quickest way to get alternative fuel vehicles on the road while the fuel infrastructure is being put in place.

In summary, Ford believes the alternative fuels can help to meet the Nation's environmental and energy challenges. A workable alternative fuels vehicle program is a more promising and efficient way to improve the air quality in severe nonattainment areas than an additional round of tailpipe standards.

For our part, Ford is taking the actions that will assure that the vehicle technology is ready to permit alternative fuels to play a role in helping more areas attain national air quality goals.

Thank you.

Senator BAUCUS. Thank you very much, Mr. Buist.

Mr. Idell, why don't you go next?

STATEMENT OF HAROLD IDELL, SENIOR MANAGER, VEHICLE ENGINEERING AND PLANNING, FEDERAL EXPRESS

Mr. IDELL. Mr. Chairman, my name is Harold Idell, and I'm the senior manager of vehicle engineering and planning for Federal Express Corp. I am responsible for the technical procurement, maintenance, and compliance policies of the Nation's largest light-duty van fleet which will be effected by pending amendments to the Clean Air Act.

On behalf of the 85,000 employees of Federal Express, I thank you for the opportunity to appear before you.

We know that our following observations and concerns are also representative of other fleet administrators and the National Association of Fleet Administrators, also.

Federal Express has been a pioneer in alternative fuels. We have over 500 vehicles in Canada operating on propane, of which over 200 have been operating for 5 years.

Federal Express has been participating in both light duty and heavy duty demonstration programs with the California Energy Commission and the South Coast Air Quality Management District.

We have and will continue to participate in the State and local alternative fuels programs.

Further, we have been working with our vehicle suppliers and component manufacturers to develop a gas-use fuel system for computer controlled engines.

As a matter of corporate policy, Federal Express is committed to the investigation of the potential environmental and economic value of alternative fuels.

We have reviewed Senator Chafee's proposal and like it because it is a broad-based alternative fuels proposal which includes the manufacturers, the fuel suppliers, and the fleets. It appears to be fuel neutral, which allows time for demonstration programs and technological developments. Any fleet proposal should tie into the broader alternative fuel amendment if it is to have an impact on the environment because all fleets together represent less than 5 percent of the total Nation's vehicles today.

The Chafee proposal addresses only centrally fueled and centrally maintained fleet vehicles, which we also support. However, we would like the following changes to the proposal.

First, exemptions from local traffic control measures, zoning codes from tunnels and buildings and parking garages, and so forth, which preclude the use of alternative fuel vehicles.

Second, special lanes established for car pools and buses and special duty vehicles should be opened up to the alternative fuel vehicles—especially in the early days of development.

Third, new alternative fuel vehicles should come from the manufacturers to avoid the issues of who is responsible for the long-term warranty on the emissions systems and the fuel systems, the performance of the vehicle, reliability, and so on. This would also encourage development of a resale market because of the reputation of the manufacturers.

Fourth, the same availability requirements that apply to your clean fuels should also be expanded to the ultra clean fuels. There must be the availability of more than one ultra clean fuel in an area.

Last, review of existing regulations governing financial responsibility for fuel storage tanks with a goal of eventually reducing premiums.

Federal Express has encountered some negative experiences with after-market conversions during its development work with the various alternative fuels. Legislative mandates for after-market conversion must be avoided. It must be the option of the fleet to make such conversions count as part of its emissions quotas, but not mandated. Only each fleet can determine if it is economically able to assume the risk of using unregulated, after-market vehicle conversions that remain unproven long term.

To protect the fleet and other users we suggest the requirement that conversion companies provide a prepaid insurance policy for the time frame defined by the EPA to cover the warranty of the emissions systems, fuel systems, and other components that fail due to the conversion to alternative fuels. Waivers would be allowed only if the automobile manufacturers provide in writing that they assume the responsibility for the warranty.

In summary, due to the high risk associated with developing alternative fuels vehicles, we believe that as a matter of national environmental policy a system of incentives will have better environmental results than mandating technology that remains unproven on a long-term basis. It is essential that Congress establish a level playing field for all the potential alternative fuels. Any legislation that mandates fuel usage that does not tie in to the Nation's total strategy for vehicles, clean air, global warming would be a mistake.

We simply request that you use good judgment, based on the technical facts available to you, to encourage fleets and the manufacturers, through incentives, to develop clean emission vehicles that do tie in to the Nation's energy, clean air, and global warming policies.

Senator **Baucus**. Thank you very much.

Mr. Fitzpatrick.

STATEMENT OF JAMES B. FITZPATRICK, VICE PRESIDENT, MARKETING AND PRODUCT PLANNING, GENERAL MOTORS CORP., ACCOMPANIED BY RICHARD KLIMISCH, EXECUTIVE DIRECTOR OF THE GM ENVIRONMENTAL ACTIVITIES STAFF

Mr. FITZPATRICK. Good afternoon. My name is Jim Fitzpatrick. I am vice president for marketing and product planning at the General Motors Corp. I have at my side here Dr. Richard Klimisch, who is executive director of the GM environmental activities staff.

GM is proud of the progress we have made to date in exploring a wide variety of alternative fuels technologies, but many questions remain to be answered before we can begin an orderly transition to their wider use. The most significant uncertainty is the acceptability of alternative fuel vehicles to the consumer.

It is clear that gaining consumer acceptance of vehicles using new fuels will be crucial in assuring a smooth transition to wider alternative fuel use; therefore, we believe that any effective legislative or regulatory strategy for promoting wider use of alternative fuels must include market-based incentives rather than command and control approaches like sales mandates.

Only by providing consumers with incentives to purchase alternative fuels vehicles and to use the fuels can any goal of wider alternative fuel use be met. If such a goal were to be pursued, a more rational and far more effective approach would be to require that State implementation plans—SIP's—for areas participating in the alternative fuels program include incentives adequate to support the desired fuel and vehicle volume goals.

On the vehicle side, incentives could include State income tax credits, sales tax forgiveness, or lower registration and licensing fees.

Any attempt to force consumers to accept new technologies that they would not otherwise want is doomed to almost certain failure. Variable fueled vehicles will be more costly to the consumer than comparable gasoline vehicles, and methanol fuel is likely to be more expensive on an energy-equivalent basis than gasoline—especially during the initial transition period.

Given these higher costs and inconveniences, such as reduced operating range, why should consumers purchase VFVs or methanol-fueled when less expensive, conventional vehicles and fuels are still available to them?

Senator Baucus, you have shown so far this morning an appreciation of the marketplace. It is a resolution of millions of individual decisions regarding the supply and demand, balancing utility, economics, style, performance—everything that is important to a consumer. That's what the marketplace truly is.

Mr. Rosenberg, when he was speaking of the marketplace, would better describe it, as he did here in his answers to your questions, as the manufacturers' burden. He is really addressing only the supply side, not the demand side, of the marketplace process.

The USA Today poll, incidentally, is not valid market research. It did not describe the real situation which will most likely exist out there, which includes lower range and probable higher fuel costs.

Congressman Andrews this morning recognized the importance of the demand side. He cited the Canadian experience, which is real and has worked. He said every kind of incentive should be considered to encourage the consumer's decision.

What we are saying is that both sides—supply and demand—must be addressed and accommodated if we are to reach our mutually agreeable solution to an alternative fuels program.

Senator Chafee, you said that this is like a chicken and an egg situation, and that's because we don't have a complete solution. We have not recognized the demand side.

We are asking for cooperation with the Government, just as you did asking for cooperation between the oil companies and the auto companies, but cooperation of all three of us. This is really the ingredient—the consumer incentives--which only you can provide in your work which can turn this chicken and egg metaphor into truly an omelette of alternative fuel vehicles which would be attractive and which would create their own consumer demand.

I also wish to address two common misconceptions involving manufacturers' sales mandates.

The first misconception is that sales mandates would be easy to implement as a matter of law. Under the laws of many States, manufacturers are, themselves, prohibited from selling vehicles directly to consumers. That was recognized here this morning. The Federal law and the laws of 46 States prohibit manufacturers from requiring a dealer to accept delivery of vehicles that the dealer has not voluntarily ordered.

Some of these difficulties are addressed by requiring that vehicles be provided to dealers on a consignment basis during the first year of a program. However, this does not get the vehicles into the hands of the consumers. It was mentioned that it gets them into the showroom possibly, or perhaps into the dealer's back lot, but not into the hands of the consumers. It simply means that the manufacturers would bear the cost of producing vehicles that might never be sold.

A second common misconception is that even relatively substantial sales mandates would not unduly burden the engineering and manufacturing resources of most manufacturers. Many believe that each manufacturer could meet such sales mandates by converting only one or two of its most popular vehicle models. I can tell you that there are over 2,000 models out there, and converting 3, 4, 10, or 20 will not do much to convert demand to those alternative fuel vehicles.

It is unlikely that any manufacturer, including ourselves, could meet ambitious sales targets with a small number of related models, and it would be even more difficult if the mandate were to require set sales volume in each nonattainment area.

In summary, GM wishes to stress that we remain firmly committed to the development of alternative fuel vehicle technology, but we must also stress that the transition to latter use of alternative fuels must be carefully considered and managed.

Consumer acceptance will be crucial to an orderly and a successful transition; thus, a legislative and regulatory initiative should focus, in our opinion, on consumer incentive.

Thank you.

Senator BAUCUS. Thank you very much, Mr. Fitzpatrick.

Let me ask a question of both Mr. Buist and Mr. Fitzpatrick. The clean fuels alternatives before us basically have a starting date of 1994 or 1995. Over the years, I remember automobile manufacturers saying it takes several years to begin design, production, and so forth. When do you have to begin making your choices? If, under these proposals, you must start selling a certain percent in the severe and extreme nonattainment areas by 1994 or 1995, when do you start making decisions as an automobile company as to when to start making the cars?

Mr. FITZPATRICK. I'm going to ask Dick Klimisch here to help me out on this one.

Mr. KLIMISCH. Perhaps a year or two ago. We have already started down the road with certain models, but the problem gets to be how many models you have to do. But for 1994 we have to have made those decisions already.

Senator BAUCUS. You have made them? What are those decisions?

Mr. KLIMISCH. Well, we've decided on one particular line of cars which was really originally decided for the California demonstration program, which is 2,200 vehicles which will be delivered out there over the next couple of years. Now, that could be converted to production——

Senator BAUCUS. Is that M-85, or is that——

Mr. KLIMISCH. Yes. Those are M-85 variable fuel vehicles.

Senator BAUCUS. And what is Ford's decision?

Mr. BUIST. We are in the same development program that General Motors is in. Tom Cackette spoke about a 5,000 car program in California. That's roughly split half between General Motors and Ford, and we're both embarking on that demonstration program in California now. So we have started the process, and that's the very early stages of the overall development process to bring a flexible fuel vehicle up to production.

Senator BAUCUS. Are both of you making roughly the same kind of car? Are you making more flexible fuel cars than GM?

Mr. BUIST. We call them flexible fuel, they call them variable fuel.

Senator BAUCUS. But it is basically the same car?

Mr. BUIST. The approaches I think are both the same.

Senator BAUCUS. What about Mr. Cackette's prediction that the answer really is reformulated gasoline? Do you agree with that?

Mr. BUIST. Reformulated gasoline? Here again, I would not disagree with Mr. Cackette that reformulated gasoline ideally is the best approach. If we are successful in developing reformulated gasoline that matches with the vehicle, then we have created the minimum disruption for society, and that's the ideal approach to take. That's why we've embarked—Ford, General Motors, Chrysler, and 14 oil companies—on a very large, expensive development program to try to find it.

Senator BAUCUS. Do you agree, Mr. Fitzpatrick?

Mr. KLIMISCH. Yes. Of course, the big advantage of reformulated gasoline is that it hits the whole fleet right away, and so the impact is sooner and bigger.

Senator **Baucus**. Do you think that will have a greater effect than some of these other clean fuels?

Mr. **Klimisch**. In the short term. In the longer term the alternative fuels is perhaps a better option.

Senator **Baucus**. By alternative fuels do you mean electrical powered or hydrogen fuel cells? What do you mean in the longer run?

Mr. **Klimisch**. All of those.

Senator **Baucus**. Rather than methanol, compressed natural gas, and all the others?

Mr. **Klimisch**. Yes, sir. And we're working on all of those.

Mr. **Buist**. Ideally you'd like to find several reformulated gasolines. One, not unlike our goal, as already announced, that takes care of vehicles that don't use catalysts, and then another one that would handle catalyst vehicles today as well as future catalyst vehicles. That's the ideal solution.

Senator **Baucus**. When will you have more precise results on your combined, joint reformulated gasoline study? When will you have more concrete results for data?

Mr. **Buist**. We hope to have some good results at the end of the year 1990.

Senator **Baucus**. Can you tell us more, Mr. Fitzpatrick, about the electrical powered car? How much are you devoting to electrical storage batteries, et cetera? And how far along are you?

Mr. **Fitzpatrick**. I'd like to address it in general terms, and Dick here can handle the technical details, which he is very familiar with.

The electrical car, of course, was introduced perhaps prematurely in Los Angeles, but we did it in order to try to beat the press getting out there before we did, which is what happens with most of our new products today. So it is out there. We're excited about it. It does have some encouraging technological improvements, and it does have exceptional performance.

It has one rather severe drawback at the moment, which is a 120-mile range. The technology is continuing.

Our ability to produce it in an economic fashion is currently under study, and our group is developing a business case for it. So we are very serious about it. But I can't tell you very much more about its availability. It is a two-passenger vehicle, which is sharply limiting, to begin with.

Senator **Baucus**. Does it make sense for the Congress to embark upon a much stronger battery storage, electrical-powered fuel initiative? I won't say it is as great as the Manhattan project, but some major initiative. Does that make sense?

Mr. **Klimisch**. It certainly does, and that kind of a recommendation has been made to the Department of Energy through the National Academy. As several people have said, that's the big obstacle in electric cars, although this car that we've got does represent a major advance. The 120 miles might well be enough for many people.

Senator **Baucus**. Why isn't the auto industry coming to Congress and saying, "Hey, let's get together on this and let's solve the air pollution problems, but we need your help by providing some incentives to help make this happen."? Why isn't the auto industry coming to the Congress with those kinds of suggestions?

Mr. **Klimisch**. We've got this tension between announcing developments and somebody mandating that we've got to produce them in 5 years. We were criticized for this electric car because we announced it but said we couldn't produce it right away. So that's a bit of a problem for us.

As Senator Chafee mentioned, one of the other questions about electric cars is where is the electricity going to come from. Although there is some capacity available, for large numbers that begins to be a concern.

Senator **Baucus**. Thank you.

Mr. **Fitzpatrick**. I would like to comment that that's a very interesting suggestion of yours. I think it is something we should consider.

Senator **Baucus**. We're ready for proposals.

Mr. **Fitzpatrick**. Okay.

Senator **Baucus**. Thank you.

Senator Chafee.

Senator **Chafee**. Thank you, Mr. Chairman.

First, a question about the cooperation you have had amongst yourselves. Do you ever get concerned over cooperation in getting these vehicles for the future because of antitrust problems? Is that a deterrent in your efforts to cooperate together—Ford and General Motors?

Mr. **Buist**. It was in the past, Senator. There is no doubt we had some problems in that regard. And it is still a concern of ours. We're effectively trying to work around it. We think we have worked around it with the auto/oil program that we're embarking on. We don't think that's a problem in that regard.

Senator **Chafee**. I just would suggest to you that I think you'd find the Congress receptive to suggestions about how such cooperation could be encouraged without a threat of antitrust suits hanging over you. It is just a suggestion, and obviously you've got to come to us with what you think would be the way to proceed. The last thing in the world we want is our own laws hindering two major companies such as you or others from cooperating and doing something for the common good.

Mr. **Buist**. I appreciate that, and I'll take it home.

Senator **Chafee**. Obviously there will be big expenses in that, and we don't want both of you trying to invent the wheel separately on this.

Mr. **Fitzpatrick**. We wish to thank you for that, too.

Senator **Chafee**. Well, I haven't produced yet. It's just a suggestion. But I will say again that I think you would find certainly the Senate receptive on that.

Mr. Fitzpatrick, you suggested—very strongly stated, I won't say suggested—don't mandate these sales, but give incentives. And then you have outlined the incentives. You have covered them all?

Mr. **Fitzpatrick**. No, Senator. We just used as examples some that would be provided possibly by the State. Canada has used Federal incentives directly. There are a wide range of incentives that would be available.

The point is that these cars and vehicles are not going to sell themselves. They are unlike anything that is out there in the marketplace today. We cannot compel people to buy them through advertising or through anything short of very significant incentives, in our opinion. And those incentives would place a tremendous burden upon the manufacturers if it had to be imposed on them, alone.

Senator CHAFEE. What do you say about the California situation where they are going ahead and doing that? From this State of California Air Resources Board progress report, if you look on page 20, it outlines the proposed schedule for these vehicles—the percentage that must be sold. Now, California is—sometimes I refer to it as the Nation of California. You can't over look it, either of you, in your sales. And they are mandating, starting in 1994, 10 percent of the PLEV vehicle, 10 percent in 1995, 10 percent in 1996. You're going to be wrestling with these mandates.

Mr. BUIST. I think there is a little bit of a difference there, Senator. If I recall right—and I'm assuming what you're looking at—that is a percentage of total sales for each manufacturer in the State, and there is a little bit more flexibility there. We're not enamored with that, but it is a little more flexible than what the administration has proposed.

The administration has effectively proposed—Mr. Rosenberg referred to it as CAFE, and he's right, and that's one of the very reasons why we think it is totally unfair for a company like Ford Motor Co., for instance, to have to establish nine sales CAFE regions in the country. In other words, let's take the city of Chicago. We would be told to sell X number of vehicles in the city of Chicago each year. If we don't meet the number, then it is a $25,000 fine per vehicle for not being able to sell the vehicles. We think that is a total impossibility and it is totally wrong to set up a system like that.

We think our responsibility is to demonstrate to the Federal Government, if that system is put in place, that, for instance, the city of Chicago must have alternative fuel vehicles, it is our responsibility, as a manufacturer, to demonstrate that we are ready to sell those vehicles in the volumes that are needed.

If a customer walks into one of our dealerships, we're ready to sell that customer that vehicle. In addition, we're ready to promote that sale. But we shouldn't have to absolutely guarantee it under the threat of a fine.

Senator CHAFEE. I think the administration has backed off from that fine.

Well, the real question comes down to whether they will try to peddle the vehicles. And, secondly, I don't know how you can keep a hotline open not knowing whether anybody is going to buy the vehicles that are intended to come off it.

Mr. BUIST. Sales change so dramatically. If you have to address nine individual cities, each city has a different mix of vehicles. One city is highly concentrated for small vehicles; the next city may concentrate more heavily on the larger, family-sized luxury vehicles. There is a dramatic mix difference and sales mix in each of the cities, and to track that and guarantee an exact number is an impossibility.

Mr. FITZPATRICK. Senator, if I can just build on that a little bit, you've made two offers of coming to the Government with possible cooperation, one on electric cars and one on antitrust. What we really ask is that, because of the uncertainty and the risk and our mutual desire for a successful program, not one that doesn't get off the ground, that we work together to develop the kinds of consumer incentives—and they'd have to be flexible because we don't know that much about our marketplace out there at that time—which would help to assure that these products will get sold. The consumers will actually want them.

If we can't create a demand for the product, then it is not going to work.

Senator CHAFEE. Aren't you doing that already with the CAFE standards? In order for you to sell the higher priced, lower mileage vehicles, you have to sell *x* number of the greater mileage, lower priced vehicles. That's a fact, and you're doing it.

Mr. BUIST. That's a fact, Senator, for a full line manufacturer like Ford or General Motors. That's not a fact for a lot of other manufacturers. And we feel the same way about that as we do about the sales requirements in the nine cities. We feel that's not fair.

Senator BAUCUS. I'm not sure what you mean by that. What do you mean?

Mr. BUIST. What you're saying——

Senator BAUCUS. Everybody is subject to CAFE. Now, they can pay fines, but——

Mr. BUIST. But a lot of manufacturers aren't in the full line business. Some manufacturers concentrate—the standard is 27.5 mpg. Some manufacturers concentrate on the lower end where 27.5 mpg. quite frankly is no problem. They don't have to be concerned with CAFE.

Our concern is that in a market in the United States today, particularly the lower end, the small end of the vehicle market is extremely competitive. There is in excess of 300 various models out there. You have to assume you can't dramatically penetrate that market and sell a large number of additional small cars to offset large car sales. It just no longer works. What you end up literally doing is giving away the small cars, which obviously you don't want to do for business purposes.

Senator CHAFEE. You're talking now of CAFE?

Mr. BUIST. Yes.

Mr. FITZPATRICK. I'd like to just address that, as well, Senator. They're really not the same thing. For one thing, we are having great difficulty meeting the standards today—the standards that are on the books. And there is a good reason for that. The consumers are telling us that they want larger cars.

Now, when we first started the small market was about 50 percent—mid-sized, regular, just putting it in those three categories. Fuel prices went up, and the standards went up, but the higher fuel prices, which got up to $1.70 a gallon, helped to push demand into the smaller cars. It also pushed demand toward the offshore manufacturers. That's when they got the very significant foothold.

Then, as fuel prices went down to close to $1, as they did three years later, the demand shifted back again. They're back to 50 percent small cars, about where it was before the fuel prices started up. But now consumers are asking for larger cars. Even the Honda Accord, which started out at 172 inches of length, has gone up a foot because—and all cars now are getting larger because that's what the customer wants.

Senator CHAFEE. Well, my time is up. I don't want to spend too much time on the CAFE thing. Thank you very much.

Senator BAUCUS. Senator Lieberman.

Senator LIEBERMAN. Thank you, Mr. Chairman.

May I just support the call and the invitation that the chairman made about seeing if we can't create the ground on which we can cooperate in the development of the electric car. It just seems to be a winning proposition in all ways. Listening to Dr. MacKenzie's testimony earlier, thinking about the importance of a totally clean vehicle, it would have a real positive effect on our environment. It seems to me—and you are better experts at this than I am, but we in this committee have talked about this before—that insofar as we are able to encourage or cajole American industry in various ways to develop environmentally sensitive technologies and products, we may also be putting us in a better position to take advantage of a growing worldwide market and demand for those products. So perhaps if we can help you get out there more rapidly with an electric car, then that is going to really help the economy overall by allowing us to sell internationally.

I'm curious, along those lines, whether any of our foreign competitors are working on the development of an electric generated car, and if you know what stage they are in.

Mr. BUIST. I don't personally know, Senator.

Mr. FITZPATRICK. I know for sure they're working on it. I don't know exactly what stage they are.

Senator LIEBERMAN. I hope we can figure out a way—and perhaps this is the moment, through this bill—to see if we can help you beat them, whatever stage they are in.

Mr. BUIST. We appreciate that.

I want to emphasize that I don't want you to assume that we're negative on alternative fuels. Completely contrary. We are positive on alternative fuels. We are deeply involved in alternative fuel technology—as deep as we can possibly get. Just understand that all we're indicating—right from the very beginning we supported the administration's alternative fuels approach. We had two problems with it. In the very beginning it didn't appear to have a level playing field for all fuels, and now we're told that it does. The second one was a sales mandate, and that's really the only significant issue we have with that approach.

We think, if incentives are put in place properly and we really take on the marketing system properly and we're willing to step up to take that on—that's part of our responsibility—we think it will work.

Senator LIEBERMAN. Doctor, did you want to add something?

Mr. KLIMISCH. I just want to say that we agree. One of the things that I'd like to disagree with Dr. MacKenzie is that methanol does not represent a dead end with respect to global warming. It may be one of the options to get there through renewable biomass fuels, for example.

Senator LIEBERMAN. Let me ask you about the whole question of consumer interest or acceptance, which I agree with you is pivotal to how well this cleaner fuels program works. I'd like to ask you two questions, both Mr. Buist and Mr. Fitzpatrick.

What is wrong with the USA Today survey that Mr. Rosenberg cited? Secondly, have you done any of your own market surveys about what the interest is and what it will take to interest people in buying these cleaner fuel cars?

Mr. BUIST. We've done some of our own work. In addition, what I'd like to explain to you is that it was previously mentioned that we conducted an early demonstration program in California with in excess of 600 Escort dedicated methanol vehicles. One of the issues that hit us right off between the eyes with that fleet of dedicated vehicles is that as soon as an owner gets in his vehicle paranoia sets in if he concludes he can't find fuel on almost every intersection.

Senator LIEBERMAN. Understandably.

Mr. BUIST. That led us immediately to the conclusion that dedicated was not going to make the transition. That's not the hardware to get from gasoline to, for instance, methanol. You had to have this flexible fuel vehicle transition, and that's why we went in that direction.

It is inconceivable to us how dedicated vehicles could work properly in nine cities. The consumer doesn't want to—why would he ever purchase a dedicated methanol vehicle in one of the nine cities? I don't understand that. It is just inconceivable that he would purchase a vehicle that he couldn't move out of the city with—that he couldn't drive to Wyoming.

Senator LIEBERMAN. That's an important plan, incidentally. It is not only a question of going to Montana, which we want to encourage, as we said earlier, but even going from Connecticut to Massachusetts or Rhode Island could be a problem.

Mr. BUIST. Now, the flexible fuel vehicle, without a doubt, can be developed. The vehicle, ten years after the first one, is going to be much better. There is no doubt about that. And we think we will make progress with respect to both fuel vehicles once we get into production. There will be a better one each year as we go along.

Senator LIEBERMAN. But tell me what your market surveys suggest about the willingness of the consumer to buy a cleaner fuels vehicle.

Mr. BUIST. There is a lot of apprehension out there, as there is with any new technology. People are apprehensive about buying a new piece of technology the first year. People will want to wait two or three years to see how it goes. They feel it is much better to wait until the second or third year. They are very apprehensive about fuel price. They don't want to buy a vehicle—even if they don't pay more for the vehicle, they want to be assured that they are buying something that is going to operate much cheaper, for instance. When they pull into that service station, they are going to have a choice every day of either purchasing gasoline or methanol.

Senator LIEBERMAN. Right.

Mr. BUIST. So there has got to be some way to direct them to methanol.

Senator LIEBERMAN. Mr. Fitzpatrick, just very briefly, has General Motors done any market surveying?

Mr. FITZPATRICK. Let me just try to answer both of your questions.

Senator LIEBERMAN. Briefly.

Senator BAUCUS. Briefly. We're going to have to move along. Thank you.

Mr. FITZPATRICK. Market research today we find has to be very sophisticated and extremely well thought out. It takes time to develop to have confidence in the results. That's why I am skeptical of the USA Today survey. It did not describe even a best shot at what the situation will be out there in 1995 when these vehicles will be available and the disadvantages to them.

We are designing research. It is going to take time to go out, because we do want to have confidence in the results. We'll be sure to report that to you.

Senator BAUCUS. Thank you very much. Thank you, Senator.

Senator Jeffords.

Senator JEFFORDS. Thank you. I have just a couple of questions.

With respect to the demand side, I know, Mr. Buist, you mentioned that you make them available and you'll promote them, but you didn't mention whether they would be cost competitive. Are you committed to making them cost competitive, too?

Mr. BUIST. We haven't look at that yet, but I think we would definitely have to address that. That, again, would be our responsibility.

We don't see this as that much different than what Germany did when Germany brought out catalyst equipped cars—what they call their green cars—versus their other cars. They put incentives in place in Germany that virtually assured that green cars would be sold on a rolling increase basis, and it has worked fantastically in Germany. That type of system, with our promotion of the vehicle, certainly ought to work in this country, too.

Senator JEFFORDS. Also, it seems to me that most families are two-car families with a commuter car and probably a long-distance vehicle of some sort. It would seem to me that what would most likely occur would be you'd have some inner-city restrictions or advantages or incentives for commuter cars, whether it is parking privilege, or whatever else, if they met certain standards. Wouldn't that be a sufficient kind of incentive?

Mr. BUIST. Those type of incentives may work. That probably wouldn't do the whole job, but that's the type of thing we're thinking of, too.

Senator JEFFORDS. Mr. Fitzpatrick, back to the electric cars for a minute. Have any studies gone on with respect to the off-peak capacity in places and any discussions with the electric industry of what kind of benefits by special hook-ups, et cetera, they could get for fueling during off-peak periods? Have there been any discussions, or are there any studies done on what the capacity is out there for electric vehicles?

Mr. FITZPATRICK. Yes, there have been. Dr. Klimisch is familiar with those.

Dr. **Klimisch**. In general, we have had some general discussions. The utilities are generally quite interested in electric cars because it does let them load level, or whatever they call it, to use——

Senator **Jeffords**. Level their load.

Dr. **Klimisch**. Yes. And that's going to work for a certain extent. That will help the transition to electric cars.

Senator **Jeffords**. Are any of those studies reduced to writing that would be available to us?

Dr. **Klimisch**. I'll see. I'm not aware of one, but if I find one I'll send it to you.

Senator **Jeffords**. Thank you.

Mr. Idell, of the 500 propane vehicles that you have in Canada, what percent are conversion vehicles?

Mr. **Idell**. They were 100 percent conversion because we could not buy the equipment direct from the manufacturer. What we got was a propane prep package, in this case, from the supplier. We did conversions originally with "mom and pop" garages here and there which was a disaster for us. We sort of developed our own supplier, so to speak, over time. That experience is why we have great heartburn with mandated conversions. Convertors are not around for parts, service and warranty claims when you've got to repair their equipment later.

Senator **Jeffords**. Mr. Buist, in Brazil they have ethanol vehicles. Where were those made? Have any studies been done on the emissions of those vehicles?

Mr. **Buist**. They were produced in Brazil for Brazil, but you have to understand—and you're right. Virtually the entire fleet in Brazil is now burning ethanol with basically, in terms of the United States, no emissions standards. So it is not really right to take the Brazil technology and say let's use that in the United States today. It just wouldn't work. Brazil has not embarked on a set of emissions standards that approach the United States.

Senator **Jeffords**. Have you conducted any studies down there on those vehicles' different utilization?

Mr. **Buist**. We definitely are. We're using the technology that we learned in Brazil on this demonstration program. And the things we learned about the engine and how it operates and what we need to modify the engine and fuel system to work successfully on ethanol we have built into our vehicles here. Again, though, with no emissions development work out of Brazil.

Senator **Jeffords**. So you haven't done any real studies, just directed at the emissions in Brazil?

Mr. **Buist**. No.

Senator **Jeffords**. Thank you.

Senator **Baucus**. Thank you very much, gentlemen. We appreciate it very much.

Senator **Chafee**. Mr. Idell, how many total vehicles does Federal Express operate, just out of curiosity?

Mr. **Idell**. We have over 24,000 in the United States. Of those, 20,000 are pick up and deliveries.

I'd like to make a point about the conversions. We have also done some in the United States on demonstration programs, and we've run into the same aggravations here as we did in Canada 5 or 6 years ago.

Senator BAUCUS. Thank you all very much.

The next panel includes: Mr. Richard Ayres of the Clean Air Coalition; George Babikian, president of ARCO Products; Mr. Michael Canes, vice president, Policy, for the American Petroleum Institute; Tim Davis, Columbia Gas, for the American Gas Association; James Pollard, senior vice president of Southern California Gas; and Mr. Ray Lewis, who is president of the American Methanol Institute in Dallas, TX.

Mr. Ayres, why don't you begin?

STATEMENT OF RICHARD E. AYRES, SENIOR ATTORNEY, NATURAL RESOURCES DEFENSE COUNCIL, INC., AND CHAIRMAN, NATIONAL CLEAN AIR COALITION

Mr. AYRES. Thank you, Mr. Chairman. Senator Chafee, members of——

Senator BAUCUS. I'm going to more strictly now enforce the 5-minute rule.

Mr. AYRES. Somehow I knew it would happen.

Senator BAUCUS. And for members of the panel.

Mr. AYRES. Mr. Chairman, I'll try to go faster, then.

Members of the committee, today the committee will be considering several proposals to stimulate new ways to reduce emissions from motor vehicles. Before responding to these proposals, I would like to comment on the context in which this discussion is occurring.

In a few weeks the Senate will take up S. 1630. It is a good effort which we support in most respects, as you know. But it asks Americans to accept dirty, unhealthy air for up to 20 years in some places.

Given this fact, we think Americans have a right to demand that their Government will explore every possible avenue to reduce emissions. In my view, that is the real issue before you today, and on the floor of the Senate.

The long deadline extensions of S. 1630 can be justified only if the Senate can assure Americans that every possible emission reduction avenue has been pursued.

Some are urging a different kind of auto emissions control policy—a policy I would call the dirty air two step. In that dance, the first step is the Nation's past failure to achieve health air quickly. The second step, based on that, is to argue that the extended deadlines mean that all additional kinds of control technologies aren't necessary in order to get to the clean air standards on time.

This line of reasoning is now being used to argue to you and the Senate that adopting alternative fuels programs makes the Senate's second round of tailpipe standards unnecessary. We disagree.

We believe our Government is obliged, in view of the long deadline extensions, to adopt a policy of pursuing the full public health benefits available from further tailpipe improvements and alternative fuels.

We strongly support the motor vehicle control program in S. 1630, as you know, and are committed to working for its enactment. It would require substantial reductions in tailpipe and evaporative emissions, improved quality control, better durability, and measures to control traffic congestion.

We wish to express strong support especially for the second-round of tailpipe standards.

Nevertheless, in the most polluted areas this will not be enough. So we support amending S. 1630 by adding a program to require, beginning in the mid-1990's, the production and sale in our worst polluted areas of a substantial number of vehicles whose total hydrocarbon pollution is significantly less than gasoline vehicles of the same model year.

To produce the environmental benefits that our cities need, both the performance standards and the required number of clean fuel vehicles should be designed to accomplish major additional pollution reductions.

In our view, the reductions promised in the President's clean fuels proposal should serve as the minimum cleanup objective for an alternative fuels program. That would be reductions equal to those produced by requiring 30 percent of new cars to meet standards for total ozone-forming hydrocarbons that are 80 percent cleaner than the first stage S. 1630 vehicle. Clean vehicles should also achieve similar reductions in toxic emissions.

We are concerned that the January 5 proposal circulated with the invitation to testify does not require passenger cars to meet a level 80 percent cleaner than the round one cars. Instead, it stops at the 40 percent cleaner requirement, with the 80 percent control requirement applicable only to fleets. This would result in a substantially smaller emission reduction from alternative fuels than would have been achieved by the President's initial proposal.

We also support provisions requiring new fleet vehicles to reduce hydrocarbon emissions by at least 80 percent in phase one of an alternative fuel program. Unfortunately, the January 5 proposal that we saw would allow these fleet vehicles to be used to satisfy the clean fuel vehicle production and sale requirement, as well, which reduces the number of clean fuel vehicles that would have to be sold to the public.

Under the California/New York proposal, fleet vehicles would not be able to be credited against the vehicles to be sold to the public. So, in that respect, the California proposal is the better one.

To work, an alternative fuel program must impose an obligation on auto makers and fuel suppliers to produce and sell the clean fuels and clean vehicles in the required quantities. A program such as Hall Fields, in our view, is a sham.

Now, industry has argued against this, but we disagree with this argument. They are the ones that will design the cars. They are the ones that will design the fuels. They are the ones in the position to make them products that Americans want to buy.

A final issue is the opt out issue. The January 5 proposal that was circulated provided that cities could opt out. This is a prime example of what I called earlier the dirty air two step. It is not acceptable public policy to turn the delayed attainment deadlines into a right to pollute as late as 2010; yet, this is the result if available control strategies such as clean fuels can be avoided based on a claim that they aren't needed to meet the standard by the applicable attainment date.

Adopting such pollution controls will reduce unhealthy pollution. It will reduce exposures. To legislate permission to ignore these opportunities on the grounds that standards won't be met by an applicable date simply doesn't work. It makes a mockery.

Senator BAUCUS. Thank you very much, Mr. Ayres.

The next witness is Mr. Babikian from ARCO.

STATEMENT OF GEORGE BABIKIAN, PRESIDENT, ARCO PRODUCTS CO., ACCOMPANIED BY DWAYNE SMITH, MANUFACTURING AND RESEARCH DEPARTMENT

Mr. BABIKIAN. Thank you very much, Senator.

My name is George Babikian, as you stated. I am president of ARCO Products Co., a major refiner marketer on the west coast. With me is Dwayne Smith, who is in charge of our manufacturing and research department. Dwayne is the individual that developed our EC-1 reformulated gasoline.

Like others that have testified before me, I honestly believe that reformulated gasoline can, indeed, be the predominant clean fuel of the future. Gasoline can be reformulated to meet equitable fuel neutral standards for today's cars, as well as for automobiles of the future.

The reason I feel this way is because last fall ARCO introduced an environmentally engineered gasoline called EC-1. EC-1 is formulated to reduce overall emissions, including toxic components from older vehicles. Gentlemen, it works.

If all vehicles in Southern California that use leaded gasoline were to use a gasoline similar to EC-1, the pollution reduction would be over 350 tons per day--350 tons per day. That's a very, very significant amount of removed pollutants.

What is even more encouraging: we have also done some limited testing of EC-1 on 1989 model cars and are very encouraged by these results. Testing shows a 12 percent reduction in exhaust hydrocarbons, a 22 percent reduction in carbon monoxide, a 3 percent reduction in nitrogen oxide, and a whopping 40 percent reduction in benzene. These, again, are very substantial reductions, and they come from automobiles with catalytic converters, the cleanest cars on the road today.

There is no question that further reductions in emissions will be necessary, so the question becomes: how should an alternative fuels program be implemented?

We believe that the fuels provision, which is the administration's proposal as amended by Hall Fields amendment, is a reasonable approach, a good approach, a doable approach—one that will work.

The Hall Fields amendment would enable all refiners, if they are willing to make the investment, to make reformulated gasoline—and, of course, that would help solve the air pollution problems that we face today.

We are also concerned that section 217 of S. 1630 would give the EPA unlimited authority to set nationwide specifications for fuels. We are concerned that EPA could exercise this authority to mandate a nationwide fuels program without fully considering all of the impacts. With such a provision in the law, we would not have sufficient certainty or stability to make the investments necessary to upgrade our refineries to produce cleaner gasolines.

We recommend deletion of section 217 and substitution of the administration's fuel proposal as amended by Hall Fields.

Let me just make a comment or two on RVP and oxygenates.

Section 214 of S. 1630 requires gasoline in class A areas to go to 7.0 pounds per square inch. We recommend that section 214 be amended to place an 8.0 PSI floor on RVP reductions because ozone-forming emissions begin to increase when RVP drops below 8.0 PSI.

We also recommend that section 218, which requires oxygenates of 3.1 percent weight, be lowered to 2 percent. The 3.1 percent requirement virtually gives an ethanol mandate, and by lowering this percentage to 2 percent, MTBE and ETBE, which are excellent oxygenates, will also be included. We have MTBE in our EC-1 gasoline, and it works great.

Finally, the production of reformulated gasoline is going to be expensive. For example, ARCO's considering a $2 billion investment to upgrade our two west coast refineries in the next 5 years. In order to make that kind of commitment, we need some assurance that we can get the necessary permits and be able to recover our costs.

Under the current Clean Air Act and the provisions of S. 1630 it will be very difficult and time consuming to obtain permits. Consideration should be given to providing emission credits from the production and use of lower emission products.

Thank you very much, Senator.

Senator **Baucus**. Thank you very much, Mr. Babikian.

Next, Mr. Canes.

STATEMENT OF MICHAEL E. CANES, VICE PRESIDENT, POLICY, AMERICAN PETROLEUM INSTITUTE, ACCOMPANIED BY TERRY YOSIE, VICE PRESIDENT, HEALTH AND ENVIRONMENT

Mr. **Canes**. Thank you, Senator.

I am Michael E. Canes, vice president for finance, analysis, and statistics of the American Petroleum Institute. With me is Terry Yosie, API's vice president for health and environment.

I am pleased to appear on behalf of API to discuss alternative fuels and oxygenated blends. API's members have been active in research and development of alternative fuels. No matter what fuels are used in the future, API's members are likely to be involved in their production and sale.

Alternative fuel vehicles may help improve air quality; however, if cost effective improvements are to be made, alternative fuels and vehicles must enjoy a level playing field. No single alternative fuel is a panacea. All have advantages and disadvantages. And no currently practical fuel is inherently clean. All require engines and emission control systems effective over many miles of operation to be tailored to that fuel.

The petroleum industry is strongly committed to improving the nation's air quality. We have already made significant changes in gasoline to reduce emissions. Detergents and additives have been developed to ensure that engines run cleaner and more efficiently. This reduces emissions from incomplete combustion.

The introduction of unleaded gasoline also exemplifies a product change that contributes to improved air quality. This program demonstrates the importance of providing adequate time and flexibility if substantial changes must be made in fuels. The program also exemplifies the need to consider vehicles and fuels as a system.

Catalytic converters were developed to allow cars to meet more stringent tailpipe standards. Yet, these converters could not function without the use of unleaded fuel.

More recently, refiners have reduced the volatility of gasoline, and further reductions may be required. The volatility cuts to date are estimated to cost in excess of $500 million per year, and the additional reductions required by S. 1630 could impose additional costs of $1 billion per year.

In recent years, oxygenated blends containing ethers or ethanol have been produced, largely in response to local programs addressing seasonal carbon monoxide problems. However, these oxygenates are quite costly, and most of the benefits from their use can be achieved at an oxygen level of 2 percent by weight.

Possible further changes in gasoline to help reduce ozone formation may well require new investments in refining equipment and time to add such capacity. However, we do not yet know which changes in the fuel and vehicles will yield the greatest air quality benefits. This is why the petroleum and automotive industries have begun a joint research program on alternative fuels.

This program will evaluate cars and trucks and the fuels they use as a total system. We will measure not just tailpipe, but evaporative emissions and running losses. We will look at changes in vehicle technology such as improved catalysts, as well as changes in the fuel.

Our research will be conducted in two phases. The first phase will examine 24 different gasoline reformulations created by varying aromatics, olefins, sulfur, MTBE, and ETBE levels. These gasolines will be tested in both current vehicles with the most advanced emission controls and older cars with a minimum of 50,000 miles on them. For comparison, methanol, namely in the form of M-85, will be tested in dual-fuel vehicles being developed for sale in the 1990's. Phase one should be completed by mid-1990.

Phase two will test some of the most promising reformulated gasolines from phase one in vehicles modified to take advantage of these reformulations through, for example, changes in engine calibration and catalyst formulation. Phase two also will test advanced methanol fuels in vehicles. This second phase should begin early this year.

The vehicle emissions data for both phases will be entered into atmospheric chemistry models to determine the impacts of the various fuels on ozone in specific areas. We also will estimate the cost effectiveness of the various fuel vehicle systems in reducing ozone.

Although we have not yet completed the research, we believe reformulated gasoline and vehicle modifications to take full advantage of this fuel could result in significant VOC reductions and help reduce ozone. And, unlike other alternative fuels such as methanol, reformulated gasoline can be used in existing cars to achieve air quality benefits. This is particularly important since older vehicles emit a disproportionately large share of pollutants.

Efforts to set specifications for reformulated gasoline are premature and should be avoided. Further, fuel specifications, alone, miss the importance of the fuel vehicle system and its role in controlling compounds created during combustion. Instead, air quality performance standards should be set for the fuel vehicle system and auto manufacturers and fuel suppliers should be allowed to develop the most efficient means of meeting these standards.

I would now like to turn to the legislation under consideration. S. 1630, as reported, appropriately avoided a mandatory alternative fuels program. Nevertheless, during debate several members expressed interest in such a program. I would like to comment on several concepts that have been proposed.

First, we understand consideration may be given to requiring that certain large retail outlets offer a specific type of reformulated gasoline. We have serious concerns with that approach. It presumes that there is one optimal type of reformulated gasoline and that we know now what it is, but this is not the case.

The main objective of the joint auto/oil research program is to investigate which changes in the fuel and modifications to the vehicle can together produce the most cost effective emission reductions. The results of this research should not be prejudged.

Further, requiring only some outlets and not others to offer any alternative fuel will create competitive disadvantages among retailers.

Second, we understand an alternative fuels program is under consideration as a possible amendment to S. 1630. Since we have not seen legislative language, we can only offer general comments.

The administration's alternative fuels program was designed to provide the incremental emission reductions needed to bring the nine most serious ozone nonattainment areas into compliance after credits were given for all other mobile source reductions. Before adoption of any alternative fuels program——

Senator BAUCUS. I'm going to have to ask you to summarize, Mr. Canes.

Mr. CANES. I'm almost done, Senator. I'll be done in just 30 seconds or so.

We urge an analysis be made of the other emission reductions required by the bill. If the other measures are sufficient to reach attainment, then there would be no purpose to an alternative fuels program. But if an alternative fuels program is developed, a performance standard should be set to allow all fuels and vehicles which can meet it to compete in the market. Vehicle manufacturers and fuel suppliers should be allowed to determine how best to meet this standard. And, very importantly, fuels which reduce emissions from existing vehicles should receive credits for those reductions under such a program.

Senator BAUCUS. Thank you very much. We appreciate it.

Mr. CANES. Thank you, Senator.

Senator BAUCUS. The next witness is Mr. Tim Davis.

STATEMENT OF TIM DAVIS, PROJECT ENGINEER, COLUMBIA GAS, FOR THE AMERICAN GAS ASSOCIATION

Mr. DAVIS. Good morning Mr. Chairman and members of the committee. My name is Tim Davis. I'm a project engineer for natural gas vehicles with Columbia Gas Distribution Cos.

My responsibilities for Columbia include the construction and design of our natural gas refueling facilities, the conversion of vehicles to operate on natural gas, and the operation and maintenance of these vehicles on a daily basis.

I'm speaking to you today on behalf of the Natural Gas Vehicle Coalition and the American Gas Association.

The natural gas industry's primary concern is to ensure that mobile source provisions of the Clean Air Act amendments include a strong clean fuel program for centrally fueled fleet vehicles.

The fleet program is justified because fleet vehicles travel 2½ times the mileage of passenger vehicles per year. Considering this, we estimate 180,000 fleet vehicles operating on natural gas can achieve the same emissions reduction as one million general passenger vehicles running on a fuel that would achieve the 30 percent reductions in ozone-producing hydrocarbons that were envisioned in the administration's original clean air legislation.

A fleet program is feasible to implement because the vehicles are centrally fueled and the fleets purchase large numbers of vehicles every year. This also additionally addresses the problem of traveling from Rhode Island to Montana.

We feel that such centrally fueled fleets are present in the right places—the serious, severe, and extreme nonattainment areas. We support amending S. 1630 to include a commercial and Government fleet program in these areas.

Our proposal would cover centrally fueled fleets of 10 or more vehicles that operate there. The baseline from which emissions would be measured would be the standards that would apply to a new model year 1994 vehicle running on today's gasoline or diesel fuel.

We recommend that reductions occur in two steps. In 1995 there would be a 30-percent reduction in the ozone-producing hydrocarbons and a 40-percent reduction in air toxins. In the year 2000 these would be increased to 80 and 90 percent. Any fuel that could meet the standard should qualify as a clean fuel, and the fleet operator should have the discretion to choose which fuel he would purchase.

Commercial fleets would be required to acquire alternative fueled vehicles when purchasing new vehicles in increasing increments after 1995. If a fleet operator could not obtain a vehicle that was suitable for his purpose, he would be allowed to opt out of the program requirements.

Government fleets would be required to increase the percentage of alternative fuels in their entire fleets on a similar schedule. Under the program we recommend, the covered fleet could earn credits that could be traded, sold, or used to reduce the number of vehicles required to be purchased. The credits would be earned by placing into service vehicles that have greater emissions requirements than those required.

Our support for a broad program to cover passenger vehicles, as well, would depend on the extent to which it includes these principals. A broader program should not undercut a fleet program.

The gas industry is working with fleet operators, vehicle manufacturers, and station operators to provide compressed natural gas at attractive prices that are competitive with current fuels. It should be noted that until recently there were no Federal programs that promoted the use of natural gas vehicles on the road. In spite of this, there are over 30,000 natural gas vehicles operating in America today. The biggest reason for this is that there is a fuel cost savings and maintenance reduction that is able to offset the cost of converting a fleet. As assembly line vehicles are produced, we envision the incremental costs will also go down.

We appreciate the opportunity to appear before you today and look forward to working with members of the committee to develop a fleet program as part of your legislation to assist achieving a cleaner environment.

Thank you.

Senator BAUCUS. Thank you very much.

Mr. Pollard.

STATEMENT OF JAMES T. POLLARD, SENIOR VICE PRESIDENT, SOUTHERN CALIFORNIA GAS CO.

Mr. POLLARD. Thank you, Mr. Chairman.

My name is Jim Pollard. I'm senior vice president of the Southern California Gas Co.

I appreciate the opportunity to testify on the need for an alternative fuels program in Federal legislation and commend you on your efforts to enact clean air legislation and also for holding this hearing during recess.

My written testimony has been submitted, and I would also appreciate an opportunity to submit a written response to the questions that were submitted to us on Monday by the Senate staff.

I support the statements of our Senator Pete Wilson and applaud his leadership on the clean air issue. I also support the tax credit proposals of Congressman Andrews, and particularly applaud the very aggressive leadership of our California Air Resources Board.

As we have all heard this morning, southern California suffers from the worst air pollution in the country. Five of the ten pollution control districts in our service territory are not in attainment. In the Los Angeles region, mobile sources account for 52 percent of hydrocarbon emissions and 72 percent of NO_X emissions, yet Federal legislation to date principally focuses on stationary sources.

Stationary sources in our region are already stringently controlled and at a significantly higher relative cost than mobile source controls. The comparison runs about 25,000 per ton for NO_X reduction for stationary versus 1,200 per ton for mobile sources, 17.5 per ton on nonmethane hydrocarbons for stationary, versus $1,800 per ton for mobile sources—a real inequity.

We believe there is a legitimate Federal concern on this issue as 15 to 20 percent of the vehicle miles traveled in southern California come from vehicles that are not certified by our State.

The inequity between stationary and mobile source controls continues to place an inequitable burden on stationary sources and, as a result, does not properly focus on mobile source emissions, which are the major cause of our pollution problems.

Because of the seriousness of the problems, we support both a strong alternative fleet program of dedicated vehicles and strict tailpipe emission standards such as those in S. 1630 for phases one and two. I reiterate we support both the phase one and two standards, as well as an alternative fuels program.

An alternative fuels program for fleets should have performance standards based on emissions reduction from the requirements for passenger vehicles. That is, beginning in 1994 we support a 30 percent lower non-methane hydrocarbon standard and a 40 percent lower air toxics standard. This standard should increase to 80 percent reduction for the non-methane hydrocarbons and a 90 percent reduction for air toxics by the year 2000.

This permits all fuels which are able to meet these performance standards to qualify as clean fuels. It does not discriminate by definition. It will encourage market diversity, and sales will be based on availability and consumer acceptance. In this respect I support Mr. Rosenberg's statement of the administration position.

The emissions standards should also consider the ozone-forming reactivity of fuels emission; that is, the less reactive fuels should be permitted to achieve a less stringent standard.

The program should include a standard for medium and heavy duty vehicles which would be the same as I mentioned for light duty vehicles.

The program should require fleet operators capable of central refueling to convert 10 percent of their fleets, beginning in 1994. This should continue on a phased in basis percentage, finally reaching 90 percent in 2002.

Alternative fuel vehicles can play a significant role in helping cities clean up their air. In the South Coast Basin, the Los Angeles area, one-eighth of the vehicles are fleet vehicles. If all of those were converted to CNG or some other comparable alternative fuel, we would see reactive organic gases reduced by 10 percent, NO_x emissions by 8 percent, and CO emissions by 12 percent. Even a moderate phase in program for fleet vehicles results in significant air quality benefits.

Equally important, which has been addressed by a number of people here today, we need Federal legislation that will encourage air districts in the development and implementation of their plans to develop creative ways to introduce market incentives to entice changes in industry and individual behavior—that in support of air quality objectives, and in that respect I support the comments made by the auto manufacturers. Such market incentives are crucial to any long-term success in achieving air quality.

Congressman Andrews addressed such a mechanism, as did Mr. Idell of Federal Express and Mr. Fitzpatrick of General Motors. I second that concern.

Again, I appreciate the opportunity to testify, and would be pleased to answer any questions.

Thank you very much.

Senator **Baucus**. Thank you.

Batting clean-up is Mr. Lewis.

STATEMENT OF RAY A. LEWIS, PRESIDENT, AMERICAN METHANOL INSTITUTE

Mr. LEWIS. Thank you very much. I appreciate the opportunity, on the part of the American Methanol Institute, of which I am president, to present a statement for your consideration in evaluating the beneficial current and future roles of methanol as a clean fuel.

Under existing clean air programs, the automobile industry has made impressive gains and progress in reducing smog-forming emissions; however, it is becoming increasingly clear that cleaner fuel components must now be made available if we are to continue to make progress.

Methanol is a clean-burning, abundant fuel with enormous promise for advancing the nation's environmental and energy security goals. Already, the methanol industry is performing an important role in producing clean fuels without government subsidy. Our industry is now a major participant in the fuel market because over one-fourth of methanol currently marketed in the United States is used to manufacture the widely accepted clean fuel additive today, MTBE, which we recently heard was part of EC–1 and performing well.

Congress now has under consideration farsighted plans to assure greater usage of clean fuels. We are pleased that methanol has been extensively evaluated. There is general agreement that methanol can play a major role in achieving the nation's clean air goals.

The California Advisory Board on Air Quality and Fuels, on which I served, recently concluded that methanol has the best potential for widespread use in the general vehicle population.

AMI supports aggressive and innovative new uses of clean fuel. We are confident that a fair evaluation will conclude that methanol should play an important role in any clean fuel program.

In arriving at future programs, however, it is imperative that we not lose sight of the important contributions already being made. New opportunities that would undermine the important progress now being made for fuels such as oxygenated gasoline, reformulated gasoline, and clean diesel replacement must not be allowed. For each fuel program methanol, or its derivative, MTBE, has demonstrated its ability to improve our air quality without Government subsidy. In moving forward, we must be certain to build on this base and not destroy it.

Performance, cost, consumer acceptance, and competition should drive the choices of present and future clean fuels. We know that in the long-term methanol represents one of the most promising new fuels.

The proposed developmental programs in California offer promise of continued technical progress, building on the existing small fleet in use by California today. However, the methanol industry is receiving very confusing signals that could make it difficult to maintain our level of support for fuel programs. Our concerns are in two areas, both of which contradict the proven concept of building on the strong existing base and maintaining fair and equitable opportunity for the various clean fuels to compete.

Our first concern is that 3.1 percent oxygen requirement at best is another hidden subsidy for ethanol, and, more likely, an ethanol mandate. As a practical matter, only ethanol can provide the percentage of oxygen in gasoline. Moreover, this is only possible because existing programs heavily subsidize the high cost of ethanol and exempt the increased vapor pressure that comes from adding an alcohol instead of an ether such as MTBE. We heard earlier that volatile emissions not just tailpipe, are a major portion of the emissions program.

We agree with data that shows that the overall benefits of oxygen are not linear and that the greatest benefit occurs at the level of 2 percent. In all events, we believe that anything above 2.7 percent oxygen is unjustified. It would simply operate as another hidden subsidy for uneconomic ethanol. In addition, marketable rights for extra oxygen would unfairly force unsubsidized methanol to provide a further hidden subsidy to the already heavily subsidized ethanol industry without material environmental gains.

The other major area of concern is that the subsidy for ethanol should not be expanded to reactive products such as ETBE. This would serve no clean air benefit that is not already provided without subsidy by the existing MTBE. In addition, it would undermine the very base load of fuel applications for methanol that is so vital for our chemical industry to make commitments required by even a modest clean fuels program. We, therefore, strongly believe that neither the Treasury nor Congress should subsidize the production of ETBE.

AMI supports the concept of an early start for a developmental program in California. Such a gradual program will continue the technical progress for vehicles, while minimizing the chance of a loss of confidence by the consuming public. It will also focus the program in the area of greatest need, and where it will receive strong local support.

This type of well-defined program will further enhance the energy security benefits of methanol. Already methanol is making a major contribution to the Nation's energy security. The United States is the world's largest producer of methanol. Some 75 percent of the methanol consumed in the United States is produced domestically, and of the limited imports more than half come from Canada and over 80 percent from the Western Hemisphere countries and New Zealand.

In addition, both the limited imports and domestic methanol contribute to energy security by providing energy diversity and decreasing the country's reliance on imported petroleum products.

Additional environmental energy security benefits result from the development of a market that will encourage construction of new methanol production facilities, including important domestic facilities directed to fuel application.

The technology to produce small domestic methanol plants has only recently been developed. These plants offer exciting new energy security benefits because the raw materials can be small pockets of domestic natural gas, waste gas that was normally vented to the atmosphere from garbage dumps, or even the waste products from existing plants that might otherwise threaten the economic viability of those factories.

Examples of each of these types of facilities are currently under construction or in the advanced planning stage today within the United States.

Senator **Baucus**. I'm going to have to ask you to wrap up, Mr. Lewis.

Mr. **Lewis**. We believe methanol—a clean, safe, and abundant, inexpensive fuel—is today and will be in the future an important part of the nation's environmental and energy planning.

AMI, representing the methanol industry, stands ready to work with Congress to establish a firm and viable foundation upon which to build a cleaner future environment.

Thank you.

Senator **Baucus**. Thank you very much.

I'd like to ask Mr. Babikian when EC-1 will be fully available nationwide to service the precatalyst cars.

Mr. **Babikian**. Well, I'm not sure EC-1 is the gasoline that will——

Senator **Baucus**. Or similar reformulated gasoline.

Mr. **Babikian**. Well, I think that is going to take some time.

Senator **Baucus**. Why is that?

Mr. **Babikian**. We're working on EC-X. I agree with the comment that was made earlier that EC-1 is an excellent gasoline, but it is not quite the formulation that is necessary to meet the clean fuels requirements in the years to come. We are working on what we call EC-X. I think we'll have that formula some time within the next 2 years.

Senator **Baucus**. And how will EC-X be used? For what vehicles?

Mr. **Babikian**. For all vehicles.

Senator **Baucus**. All vehicles?

Mr. **Babikian**. For all gasoline vehicles.

Senator **Baucus**. I'm sorry. When did you say that would be available?

Mr. **Babikian**. I think we'll have that formula sometimes within the next 2 years. I hope I'm not being too optimistic about that.

Senator **Baucus**. What will its capacity be?

Mr. **Babikian**. That's the next thing we have to determine. Once we determine what the formula is—and we have a rough idea what that is—then we've got to calculate how much of that fuel we can make with our present refinery configuration and what kind of capital will be needed and what kind of time frame we will need to make the capital investments to make enough of that gasoline to satisfy the needs of the country.

Now, we're just a west coast marketer, so we're looking at two refineries. We have got some general ideas, and we think it is going to take $2 billion with the general formula we've got in mind to make enough gasoline to satisfy the needs that we have on the west coast.

Senator **Baucus**. Do you think these clean fuel proposals are truly fuel neutral? I say that because you heard GM and Ford say earlier that they would be able to meet 1994 clean air vehicle mandates with methanol. You say it is going to take 2 years to produce EC-X. I'm not trying to put words in your mouth. You are a fuel producer, you are a gasoline manufacturer, do you think that this is truly fuel neutral?

Mr. BABIKIAN. I think they are at this point in time. At this point in time I am satisfied that they are, and there isn't the slightest doubt in my mind that we are going to be able to meet at least M-85 emission standards. So I have no problem with that at all. None whatsoever.

Senator BAUCUS. Do you agree, Mr. Canes?

Mr. CANES. Well, the one thing that I want to be sure of is that the proposals include credits for putting fuels into the older cars. Under that understanding of what the proposals might mean, then I would say they are fuel neutral. Yes.

Senator BAUCUS. Mr. Canes, you know that section 218 of the bill requires that gasoline sold in the carbon monoxide nonattainment areas in the winter months, beginning next year, must contain an oxygen content of no more than 3.1 percent by weight. You also know that oxygenated fuels significantly reduce carbon monoxide levels in cold temperatures—particular at higher elevations. For example, in Montana the cities of Great Falls and Missoula, MT, are both carbon monoxide nonattainment areas, and the expanded use of oxygenated fuels like ethanol will help, as you know, enable these communities to reach attainment.

I might add parenthetically that, coming from an agricultural State, that the use of ethanol currently reduces grain inventories—and particularly reducing agricultural subsidies by $600 million a year. So that is an important use for that fuel.

Do you agree that oxygenated fuels can reduce carbon monoxide emissions?

Mr. CANES. I think there is no doubt. The evidence shows that it does. The question is only at what level.

I share Mr. Lewis' views that a 3.1 percent mandate is not an appropriate policy. There are several reasons for that. Number one, most of the benefits accrue to the older cars. That is, as catalyst technology has developed over the years, the improvement already in carbon monoxide emissions is so great that the use of the oxygenated fuels adds very little at that point. That is, the incremental reduction from that is relatively small.

But second of all—and more importantly, perhaps—once you get beyond 2 percent oxygen content in these older cars, the greatest proportion of the benefits have already been accrued. So now it is a question of cost versus effectiveness. As you keep going up, it is ever more costly to add these oxygenates, and yet the incremental reduction in emissions is very small.

So cost effectiveness is basically achieved at 2 to 2.7 percent, in that range, and it is not necessary to go to a 3.1 percent mandate.

Senator BAUCUS. There are conflicting views here. Different interests have different points of view. The fact is, we have come down from 3.7, set in the 100th Congress, to 3.1, moving in the direction that you are indicating.

Senator Chafee.

Senator CHAFEE. Thank you, Mr. Chairman.

Mr. Lewis, you gave a fervent pitch for methanol, and the view of your testimony was directed toward the failings of ethanol. I'd really like to spend a little more time on the advantages of methanol, as you see them.

When we think of methanol we think of increased formaldehyde emissions, cost more than gasoline, it will make us more dependent on energy imports. That's all frequently stated. It contaminates ground water, increases insurance costs for fleet operators. I'll give you another chance to make your case for methanol without dealing with ethanol. What do you say to those?

Mr. **Lewis**. One quick point. I was not dealing with the failure of ethanol; I was dealing with the economic failure of ethanol and the unfairness of people defining a level playing field as one that allows everyone else to compete rather than giving each person equal incentive and allowing us to compete for marketplace.

My pitch is that we can compete, and I think the kind of things you're talking about are the examples of why we can compete. Methanol can be widely accepted, and I think the reason that subsidies for other fuel products are needed is to overcome the benefits that methanol has right now without subsidy and allow others to catch up. I think the reason General Motors has developed a methanol car is because they believe the consumer will buy it, their knowledge of the emissions reduction, the acceptance, and the problems—the engineering, the close association of being another liquid fuel, et cetera—that would encourage the buying public to buy that methanol-powered car, and that's why they elected to develop methanol fuel based autos. In addition, methanol fuel achieved cleaner emissions.

Now, let me deal with some of the problems you mentioned.

Formaldehyde—I think we should negate that problem because standards are being set. We're going to say it can't be above 0.15 in California, at least, and so if methanol is we won't have a deal, and so we'll be out of the business on that one. But we think we'll meet the California standard with improved technology.

In cost, I think it is very much going to be the most competitive alternative fuel. The calculations available show other products being competitive only when such things as road tax, expanded infrastructure costs before compression-based fuels can be used onboard tanks and the like are left out. You heard earlier testimony that promotes incentives such as costly investment tax credits for people to purchase autos or retrofits for the tank on board, and the compressor delivery system. Some officials want to use rate basing for the pipelines and make all the consumers pay.

If we do this on an equal basis, we'll compete. And if we aren't able to compete, then we shouldn't have a place at the table. But let's let the consumer and let's let Congress see the proper evaluation of how the various fuels can compete.

Senator **Chafee**. Do you believe that most methanol will be made from imported gas?

Mr. **Lewis**. I think a lot of methanol will be made from imported natural gas because it is an economic resource going to waste where people are unable to find another use for it. I think we have just begun to scratch the surface on how much methanol can be made from domestic garbage and off-gas from domestic plants and things like this. As I mentioned, there are three domestic plants currently under very serious consideration, and I think there is an awful lot of potential in the States.

Right now some of the plants that are under construction—they just received loans—are being put in jeopardy because of some rulings that are about to go down that would undermine the business that they were going to develop those plants on.

Senator CHAFEE. Those rulings being what?

Mr. LEWIS. Being a Treasury Department ruling allowing subsidy for a chemically reactive ehtanol product—ETBE—to undermine the marketplace that was justifying the building of this methanol plant out in Denver, and others.

Senator CHAFEE. Mr. Babikian, you said when you were talking about EC-1 that you reduced the benzene, I believe, in that?

Mr. BABIKIAN. Yes, we did.

Senator CHAFEE. Then what do you do with the benzene?

Mr. BABIKIAN. Dwayne, do you want to answer that question?

Mr. SMITH. We did two things. One, we didn't make as much to start with.

Senator CHAFEE. I don't quite understand that. If you take out the benzene when you make the EC-1——

Mr. SMITH. We produce benzene in the refinery. That's part of our process in creating octane. By putting MTBE in and other materials, we reduced our need for other octanes, so we didn't produce as much to start with.

Secondly, we redirected benzene into our other pool, which goes into the catalytic cars. All of our claims and all of our numbers are net of that. In other words, the benzene goes in the cars with catalytic mufflers that can handle the benzene, so there is a net reduction, and all of our claims are net of that.

Mr. BABIKIAN. One other comment. We're looking at some other formulations, and in the other formulations of gasolines, one of which perhaps we'll come out with this year, we reduce benzene in gasoline. It is not put back in any kind of gasoline. So it will be extracted and either sold to the chemical industry as benzene or it will be sold to the military in JP-5 fuel. But it will not be in other gasoline.

Senator CHAFEE. Fine. Thank you very much, gentlemen.

Senator BAUCUS. Thank you, Senator.

Senator Lieberman.

Senator LIEBERMAN. Thank you, Mr. Chairman.

Mr. Canes and Mr. Babikian, do I understand it to be the position that you are taking that the oil industry generally is opposed to the alternative fuels proposals and suggests, instead, that reformulated gasoline is the way for us to achieve cleaner air?

Mr. BABIKIAN. No. I'm not opposed to the alternative fuels proposal—certainly not the one proposed by the administration and amended by the Hall-Fields bill. I think that's a good fuels neutral bill.

Again, I think that all fuels that have the potential to clean up the air should be allowed to compete, and the fuel that can compete at the most effective cost is the fuel that ought to survive. That's the way the system works in this country, and I see no reason to deviate from that.

I'm convinced that we can play in that ball park. If we can't, we're going to go the way of the dinosaur.

I only ask for the fuels neutral field, and I think we have that in the administration proposal as amended by Hall-Fields.

Senator LIEBERMAN. Understood. Is ARCO then doing any developmental work on methanol or other alternative fuels, or are you focusing on the reformulated gasoline?

Mr. BABIKIAN. We're focusing 99 percent of our talent on reformulated gasoline. Our people in our Anaheim research facility, which reports to Dwayne, are working straight out with coming up with EC-X, and we see probably one or two different forms of emission control gasoline before we come out with the final formula. Hopefully we'll have another one this year besides EC-1.

Senator LIEBERMAN. Mr. Canes, what about the industry position generally?

Mr. CANES. I think, as I said in the oral testimony, the first thing we question is if it is really going to be necessary to do that after everything else that has been done in the bill is taken into account and their impact on attainment in these various areas. But——

Senator LIEBERMAN. Your suspicion is that it may not be necessary——

Mr. CANES. It may not be necessary.

Senator LIEBERMAN [continuing]. To go to an alternative fuels program?

Mr. CANES. Yes. We would certainly raise that question. But beyond that, if it is necessary, then I think that the major point that we would make is that you ought to be able to achieve attainment by reducing emissions from any kind of vehicle. Most of the proposals that we have seen tend to put it on a per vehicle basis and only new vehicles get counted. If you do something that reduces emissions from older vehicles like what ARCO has already done with EC-1, no credit is given for that. The systems don't build in a mechanism for allowing that to be part of the attainment in these alternative fuels programs. That we object to. That we would oppose.

But if the programs are set up in such a way that wherever you get your reductions from, whether older cars or new cars, they are part of what has to be done in an alternative fuels program to get you to your attainment goal, then we would be willing to accept such a thing.

Now, in the data that ARCO offers in their written testimony I think you will find that they say that they have been able to achieve significant reductions in emissions in new cars—that's in the submission of ARCO. These new cars, the ones that we're talking about—1989's and 1988's—will be older cars in 1990 and 1995, and so on. If they have a fuel, or if the industry comes up with a fuel after this auto/oil research program that can achieve significant reductions in those cars that will then be the older cars, why shouldn't that be part of the achievement of attainment in these areas?

Senator LIEBERMAN. I agree.

Let me raise this question. I gather that in California a proposal will be made to the Air Resources Board for regulations later this year to mandate the provision of cleaner gasoline by a given date.

Perhaps we should do the same nationally through Congress in this bill. What would you say about that?

Mr. **Babikian**. I personally don't like mandates for the reasons outlined today, and there is no point in my going over those. We're not going to have—I don't feel that we'll have any difficulty meeting the mandate requirements that the State of California will require, at least the way clean fuels are described, as we understand them today, because, again, I am absolutely convinced we can make sufficient quantities of reformulated gasoline that will certainly meet M-85 specifications. If those are the specifications, I don't think we'll have any difficulty. But the idea of mandates, per se, doesn't set well with me because of the inherent problems that go along with that.

Senator **Lieberman**. I understand.

Mr. Canes, if it is good enough for California, why not the rest of us?

Mr. **Canes**. I think one of the points I made in my oral testimony was it would be premature to do that. We're just now engaging on a massive research project. We're going to look at 24 reformulations of gasoline just in phase one, and we'll try to find out what the best ones are and we'll look at cost effectiveness and these will be fuel and vehicle combinations, and then we'll do a phase two, as well, where we will look at more advanced technologies for vehicles and for fuels. It is going to take quite a bit of time, maybe a few years, before that phase two is completed. Why make a choice today when we don't really know what the best choice is for the combination of chemicals that ought to be in gasoline to most help?

Senator **Lieberman**. I guess if I was in the automotive industry at this point I'd say if you believe in technology forcing legislation for our industry, why not for the oil industry as well? In other words, why not set some goals so you'll do it more quickly than you otherwise would do it?

Mr. **Canes**. Whether or not that is a good idea, there is a difference between setting a goal for a fuel and specifying the commodities that have to be in the fuel.

Senator **Lieberman**. Understood.

Just a final question. As far as you know, are none of the other petroleum companies working on methanol or other alternative fuels? Are you going to leave that fuel to Mr. Lewis' membership?

Mr. **Canes**. Well, part of the auto oil program is to look at M-85 vehicles in the first phase and the emissions characteristics of those vehicles will be compared to those of these various reformulated gasolines. In phase two, they will be looking at more advanced methanol vehicles, as well. So we are looking, as an industry, and with the auto industry, at methanol, as well.

Senator **Baucus**. I just have one quick question for Mr. Canes and Mr. Babikian. What is the percentage probability that reformulated gasoline will be able to meet round two standards in the year 2003?

Mr. **Babikian**. I think it has to be a combination not just of reformulated gasoline, but also catalytic.

Senator **Baucus**. That's the next question I was going to ask. What is the probability that a combination will be able to meet round two?

Mr. **Babikian**. I have my own personal opinion, Senator, but I'm very optimistic, as a general rule. Let me refer that question to someone that is more qualified to answer it than me, Dwayne Smith.

Senator **Baucus**. All right.

Mr. **Smith**. I feel very positive that it can be achieved through a combination effort of the system, which is the fuel, the auto, and the catalyst. Don't forget the catalyst.

Senator **Baucus**. Thank you.

Senator Chafee.

Senator **Chafee**. I think those last statements were comprehensive.

Senator **Baucus**. Thank you very much. We appreciate it. You have been very helpful. Thank you.

[A letter from Mr. Babikian follows:]

ARCO Products Company
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Post Office Box 2570
Los Angeles, California 90051-0570
Telephone 213 486 1275

G. H. Babikian
President

January 17, 1990

The Honorable Max Baucus
Chair, Senate Subcommittee on
Environmental Protection
United States Senate
Washington, D.C. 20510

Dear Senator Baucus:

I would like to clarify for the record my responses to two questions after my statement at your Subcommittee hearing on January 11, 1990.

o When we produce a reformulated gasoline for newer cars, we plan to remove (through processing) a substantial amount of benzene from the refinery streams that are used to blend the new gasoline. The benzene that is removed will not be added to any other gasolines that we produce. It will likely be sold as petrochemical feedstock or used in jet fuel.

  This additional processing for benzene removal will result in a substantial reduction in benzene, but it will not result in the total elimination of benzene from reformulated gasoline.

o When I said that I believed that improvements in fuel and vehicle technology could meet the second round vehicle emission standards, I meant that in terms of "in-use" vehicle emissions, not "certification" emissions. In-use emissions are the important emissions, since those are the ones that contribute to air quality problems.

Thank you again for the opportunity to appear before your Subcommittee.

Sincerely,

George Babikian

George H. Babikian

ARCO Products Company is a Division of AtlanticRichfieldCompany

Senator BAUCUS. Our final panel consists of: Mr. Tommy D'Angelis, who is president of Colonial Service Station, for the Service Station Dealers of America in New York; and Mr. Jim Willingham, who is an auto dealer, for the National Automobile Dealers Association in Long Beach, CA.

Gentlemen, you've heard it all. You're in the enviable position of being able to capsulize it all and set us straight.

Go ahead. Mr. D'Angelis, why don't you begin?

STATEMENT OF TOMMY D'ANGELIS, PRESIDENT, COLONIAL SERVICE STATION, FOR THE SERVICE STATION DEALERS OF AMERICA, ACCOMPANIED BY JIM DASKAL, GENERAL COUNSEL

Mr. D'ANGELIS. Mr. Chairman, members of the subcommittee, I'm Tom D'Angelis, president of the Colonial Service Station on Staten Island. To my left is Jim Daskal, my general counsel, who will help answer any questions you may have.

Senator BAUCUS. Thank you.

Mr. D'ANGELIS. After sitting here and listening to all this testimony from EPA regarding alternative fuels and electric cars, I'm going to call the Times tomorrow and sell my station, because I don't think I can survive it.

I am appearing on behalf of the Service Station Dealers of America, which is called SSDA, which serves as the voice of America's 60,000 independent gasoline retailers. The members of SSDA typically own and/or operate a single service station, which is their sole means of supporting their families.

Today I'd like to discuss SSDA's position on alternative fuels, with the focus on the critical impact of such programs on motor fuel dealers such as myself.

SSDA supports developing an alternative fuel program, and so testified before this subcommittee in the last Congress. We also supported the Sharp-Rockefeller Alternative Fuels Act of 1987.

First, let me point out that Congress cannot look at this segment of the Clean Air Act in isolation from the other seven major environmental programs we are currently implementing, as well as the other requirements of S. 1630 such as stage two vapor recovery.

In particular, we are concerned with the effects of an alternative fuels program on our ongoing efforts to protect the Nation's ground water from the environmentally hazardous underground storage tanks. Many dealers have already spent a substantial portion of their net worth replacing their tanks. Some because of futile efforts to get tank insurance, others because State law required them to do so.

In my own case, I purchased my station in 1985. Shortly thereafter, New York imposed regulations for underground tanks in stage two. I knew that I would have to make some additional and significant investments in the property in order to comply with the laws. What was the hope for achieving the American dream has become a nightmare.

The total cost of renovating to comply will be in the area of $250,000. The bureaucracy which regulates the replacement tanks—especially in the New York area—is unbelievable. The cost of the installation is escalated because of unnecessary regulatory provisions. If an alternative fuel program is to work, this red tape must be cut.

We are primarily concerned with methanol's safety due to its toxicity, flammability, and the consequences of a methanol tank leak. We believe that the only way to handle methanol safely is to use a double-wall or secondary containment tank system. SSDA strongly disagrees with the view that a methanol tank leak is of less concern than a gasoline leak.

We dealers are also concerned about clean air and clean water, like anyone else.

Given that methanol would require secondary containment tanks, let me, as a dealer, walk you through how installing such tanks could affect the Nation's independent dealers and their customers.

In many cases, such as my own, we are talking about replacing brand new gasoline tanks installed to meet one set of requirements in order to meet a different set. You don't have to be a businessman to recognize that this just does not make any sense.

For example, in Southern Connecticut the dealers replaced their tanks in compliance with State law. Under the current administration proposals, these dealers would have to rip out these newly installed tanks to put in new, alternative fuel tanks.

I would like to ask this committee where you expect independent, small dealers like myself to get this money from? The banks won't give it to us by any means.

All of these requirements added to States' vapor recovery costs and the cost of other major rulemakings heaped up upon us could easily be the cause of many more thousands of dealers closing down their businesses.

Considering that the average independent dealer in the United States has a net worth of only $81,000, and equipping a station with secondary containments would cost anywhere from $50,000 for one tank to $120,000, it is not difficult to see that the closing of more independent stations is a consequence legislators must consider.

Stage two in New York is costly, and it is costing $24,000 to $36,000 or more to install.

No small business group has ever been asked to do so much to implement environmental regulations at one time as have the American service station dealers. No other industry's survival is more threatened.

The administration proposal would guarantee that we will never obtain tank insurance because handling methanol exposes us to Superfund liabilities.

Finally, let me paint the independent dealers' dilemma as it relates to the American financial community.

In many areas of the country banks will not lend money to service station dealers because they fear that they would inherit environmental liabilities. Alternative financing sources must be made available to us if we are to be able to comply with environmental demands.

For example, the process must be simplified for us to obtain guaranteed SBA loans to implement any service station retrofitting this Congress may legislate. This is extremely important if we are expected to perform our role in making any clean air legislation work.

The Service Station Dealers of America will do its part to help solve the alternative fuels "chicken and egg" problem, but we need your help through incentives and not mandates.

A program must be fuel neutral and provide small businesses the technical and financial assistance needed to make it work. It must also be realistic, where current proposals are not.

Senator BAUCUS. I'm going to have to ask you to summarize, please.

Mr. D'ANGELIS. We look forward to working with you and this committee in the future, and we would be happy to answer any questions.

Thank you.

Senator BAUCUS. Thank you very much. We appreciate that.

Mr. Willingham.

STATEMENT OF JIM WILLINGHAM, AUTOMOBILE DEALER, FOR THE NATIONAL AUTOMOBILE DEALERS ASSOCIATION

Mr. WILLINGHAM. Mr. Chairman and members of the subcommittee, my name is Jim Willingham. I am a Buick, GMC truck, Lincoln/Mercury dealer from Long Beach, California, located in the southern portion of Los Angeles County.

I'd like to thank you for this opportunity to testify on Senator Chafee's proposals for the alternative fuels. I believe these will have a significant impact upon the small businessman, the franchise new car dealers of America.

As with any alternative fuel proposal, the automobile and truck dealers' principal concern ultimately deals with whether it will fill the consumers' needs. Will they buy the product?

NADA, the National Automobile Dealers Association, feels that a properly structured alternative fuels program is an innovative approach which may provide additional clean air benefits, and we compliment Senator Chafee and those members of this committee who have worked so hard on this proposal.

A key provision in Senator Chafee's alternative fuels program, as well as the administration's bill, is the sales mandate. In the retail new car and truck business, the manufacturer does not sell the automobile to the ultimate consumer. The independent, small, new car dealers who are franchised to sell a manufacturer's product is the one who, in the end, retails that vehicle to the consumer.

A dealer purchases his vehicles from the manufacturers, finances them through a floor plan arrangement that he has set up with his bank, and holds them in inventory until they are sold. If the vehicles do not sell, the dealers are forced to finance these automobiles for long periods of time, and they must be carried over into the future model year. This alternative fuel proposal could result in having hundreds or even thousands of vehicles in inventory at the end of any current model year.

Although some have characterized this provision as one which holds the manufacturers' feet to the fire, the burdens and expenses of an unsuccessful program will be borne by those who have a limited role in its success and those who can least afford if the program fails, and that's the small businessman that I refer to—the franchise new car dealer.

There are a number of factors relating to an alternative fuel program which will have a big influence on whether a consumer will purchase these new vehicles. Consumer acceptance of these cars will ultimately determine the success or failure of the entire program. However, dealers have no control over many of these factors. Let me point some of those out to you.

The model availability. Which models will the manufacturers choose to put these alternative fuel engines in?

The performance. What is the durability, driveability, cold weather starting? How do they perform on the freeways?

The vehicle range. If you have frequent stops to refuel the automobile—and we know that some of these alternative fuels don't get as good a fuel economy or mileage as does gas mileage, so we feel this refueling problem would influence the choice of a product that the consumer may purchase.

Fourth, the cost of the fuel. He is going to know what the difference is between gasoline and the alternative fuel.

What about the availability? Is it going to be available, in my case, in Las Vegas? If a family wanted to go for a weekend, could they purchase the fuel to return?

And, finally, the cost of the vehicle. The price that manufacturers charge for these vehicles will be critical to the success of this program, and the dealers really have no influence over the manufacturers' pricing policies.

New and innovative automobiles are not always readily accepted by the consumers. We have seen that through the diesels and the other automobiles that we have offered for sale. There will be comparable models sitting on the showroom floor, and he can make a choice. So we must be very careful that he has no suspicions that the alternative fuel automobile will not perform to his expectations.

During the past few months, many new car dealers have expressed their concerns to your committee about the potential burdens and the financial hardships that they will experience if consumers do not purchase these vehicles. We commend the committee for recognizing the problem and for responding to our concerns by requiring the manufacturers to provide these alternative fuel vehicles to the dealers on a consignment basis.

Senator Chafee's amendment provides that the arrangement is to be in effect the first year of the program. While this certainly serves to give us some relief from the disastrous impact of high finance and inventory charges from a failed program, we feel that it is too short, and we probably should have 18 to 24 months if it is appropriate.

If the program is not successful in the first year it is going to become necessary for the manufacturer to switch the model availability, to alter his advertising or marketing program to make the consumer interested in that vehicle.

We believe that an additional 6 to 12 months consignment is necessary to protect the dealers from these burdens and from any mistakes that could be made by the manufacturers and the Petroleum Institute.

We have one additional suggestion which we think is necessary to make the consignment proposal work. Language should be inserted which provides that vehicles given to the dealers on the consignment basis should remain on consignment until they are purchased by the retail customer or until possession is given back to the manufacturer. This would avoid pressure applied to the dealers to purchase these vehicles as part of some other program that they worked with their franchise dealers.

Mr. Chairman, if Congress sees fit to establish an alternative fuel program, the new car dealers of this Nation will actively work to make the program a success. All that we ask is that small business dealers be protected for a limited period of time in order to prevent any financial devastation which might happen if these inventories sit for long periods of time. My own inventory expense is more than my rent and mortgage.

Thank you very much.

Senator BAUCUS. Thank you very much, Mr. Willingham.

You partially asked the question I was going to ask—that is, your recommendations for getting the dealer, if not off the hook, at least address some of the concerns you have that consumers might not want to buy the cars that you have on hand. Do you believe that providing for a total consignment will basically solve the dealers' problem?

Mr. WILLINGHAM. I believe that would. We sometimes have to negotiate with our manufacturers. He has these hot models that we want to get our hands on, and the customers want to get.

Senator BAUCUS. And he has some others he wants to unload on you.

Mr. WILLINGHAM. Yes. So you do this and we'll do that. We'd like for that to be in the statute.

Senator BAUCUS. More precisely, what would you recommend in that regard?

Mr. WILLINGHAM. I would recommend that these vehicles be consigned until they are sold to the retail customer.

Senator BAUCUS. And how do you think the manufacturers will react to that? What modifications might you suggest so that manufacturers and dealers and the Congress come up with some appropriate solution here?

Mr. WILLINGHAM. What we're asking for is for the first 2 years use the consignment basis, then let the marketplace adjust to the consumer. I believe the dealers could handle that.

Senator BAUCUS. Would the auto industry vehemently object, or not? I wish they were here.

Mr. WILLINGHAM. I don't know that they would, but it would be a large expense for them. It would be a tremendous expense that they would have to bear.

Senator BAUCUS. And then it would be up to them to get to the dealers the incentives——

Mr. WILLINGHAM. Some way to market that.

Senator BAUCUS [continuing]. To market them. That's correct.

Mr. WILLINGHAM. That's correct. We feel that they will look at the scale holding these vehicles in inventory, the cost of that inventory, against a rebate program, some special incentive program, to lower the cost and to influence the consumer.

Senator **BAUCUS**. Thank you.

Mr. D'Angelis, could you give us a rough idea how much it would cost to install a methanol pump?

Mr. **D'ANGELIS**. What is involved there is a tank. The methanol tank, alone, is about—a 4,000 gallon tank, alone, is about $8,500. And then we're talking about the installation of it, which could cost another $10,000 or $15,000. This would probably run into quite an expensive situation.

Mr. **DASKAL**. Actually, Senator, the number he used was for a typical state-of-the-art gasoline tank.

Senator **BAUCUS**. Right.

Mr. **DASKAL**. The reason we think a methanol tank would run more is because it is our view, based on some correspondence that has been received from the Office of Underground Storage Tanks, that you would need secondary containment and double wall tank installations. Usually for three 10,000 gallon tanks, which would be your typical service station, depending on the area of the country, we've been running from $80,000 to $120,000.

Senator **BAUCUS**. Let's assume we have an alternative clean fuels program; that is, let's assume we have taken care of the dealer's problem, so now we've got the service station operator's problem as your additional costs. How do you propose we take care of that?

Mr. **DASKAL**. That's something that we've given long, hard thought to. Obviously there are some existing SBA programs that probably need expansion, and we mentioned the fact that the red tape you have to cut through to get at those programs is very significant. But one of the important points we want to leave with the committee is the extreme difficulty our industry is having obtaining financing from the banks. Even though we incorporated specific language in the statute in 1986 to deal with the bank liability problem, they are just terrified, quite frankly, that they would, for example, lend a dealer money to upgrade tanks. The dealer would have a catastrophic tank leak—a Canobe Park type of tank leak. The dealer would go broke, leaving the bank foreclosing on the mortgage holding title to the property, and thereby assuming liability. That's not the way the law is supposed to work, but trying to convince the bankers and their counsel of it has proven to be intractable, and that's the reason why we're——

Senator **BAUCUS**. Well, why don't you propose an amendment to help make it clear that that's not the intent? There are ways to skin a cat around here. And also another proposal to address the financial costs?

Mr. **DASKAL**. We'd be glad to work with the committee on that, and that's one of the things we had hoped to work with the administration on as we go down the road, because I don't think that—in formulating the initial proposals, we think that the focus was mainly upstream on the manufacturers and the refiners, as opposed to the downstream effects with the retailers.

Senator **BAUCUS**. Thank you very much.

Senator Chafee.

Senator **CHAFEE**. Thank you, Mr. Chairman.

First I'd like to say that you mentioned working with the committee downstream here somewhere. The train is about to leave the station here. We are going to take up this bill in 10 days.

Mr. DASKAL. Senator, I meant that the committee was working with the folks downstream in the marketing and distribution of gasoline.

Senator CHAFEE. But any suggestion that you might have in connection with this bill, don't delay. That's my message in that connection, because we are taking up on the 23rd.

Mr. D'Angelis, I'm interested in your comments about stage two, because, although that is not involved with this particular amendment we're dealing with today, nonetheless it is in the bill. You indicated that it costs about $24,000 to $30,000 per station to install. Are you sure of your statistics in that?

Mr. D'ANGELIS. Yes, I am.

Senator CHAFEE. And how many pumps are you talking about? How big a station?

Mr. D'ANGELIS. I'm not sure.

Mr. DASKAL. We're talking about basically a 12- to 18-nozzle installation. Depending on the region of the country in which the dealer is obtaining the quotes and what we have seen out of New York and New Jersey, a good base estimate is $2,000 to $2,500 per nozzle, when you include the above-ground and underground costs, as well as labor. That's why some of the language in the report gave us some real concerns, because what was included in the report was based primarily, I think, on some early estimates out of St. Louis which just aren't representative of what we're seeing today.

Senator CHAFEE. If you're constructing a new station, how much would it be over the installation of a regular hose? What is the differential? Most of these are retrofits, and I recognize that, but I'm just curious what, in excess over the normal cost, would it be?

Mr. DASKAL. Senator, could we have a day or two to get that information and supply it to you?

Senator CHAFEE. I'm not asking you for exact costs, down to the penny. I'm just curious what ranges we're talking about here.

I was interested in your testimony, Mr. Willingham, about the dealers. In your statement you talk about an 18-month consignment.

Mr. WILLINGHAM. Yes, 18 to 24. After meeting together, we feel that we're going to need a little more time than that 12 months.

Senator CHAFEE. And that pretty well represents the views of your membership?

Mr. WILLINGHAM. I think so. Yes. The manufacturers have not really opposed us on this. They testified this morning—and it wasn't one of their main points, I noticed, and I'm sure they had your amendment.

Senator CHAFEE. It's just as well we don't ask them back, I guess.

Mr. WILLINGHAM. I agree.

Senator CHAFEE. Fine. Thank you very much.

Senator BAUCUS. Thank you, Senator.

Mr. D'Angelis, I understand you have a 2:59 plane to catch. Is that correct?

Mr. D'ANGELIS. Yes, we do.

Senator BAUCUS. So feel free to excuse yourself at the appropriate time.

Mr. D'ANGELIS. Thank you very much, Senator.

Senator CHAFEE. I think now is the appropriate time.

Senator LIEBERMAN. Wait a minute, Mr. DeAngelis, because I just want to tell you that I thought your testimony was excellent.

Mr. D'ANGELIS. Thank you very much. I appreciate that.

Senator LIEBERMAN. Wait a minute, Mr. D'Angelis, because I for. I think that the point that you made about our service station people in Connecticut is absolutely right. We have asked them to put in new tanks. They have all gone through the expense of doing that. If we get into the alternative fuels we are going to have to essentially go back and say, "Go back and dig these new tanks up and put in double wall tanks."

Mr. D'ANGELIS. Exactly. And that's what we're going through now. Yes.

Senator LIEBERMAN. That's unfair.

And I say the same to you, Mr. Willingham. I thought that your testimony was excellent, and I hope we can respond to your concerns.

I have just one brief question for you, Mr. D'Angelis. Am I correct in concluding that the use of the so-called reformulated gasoline does not require any changes in the typical gas station in terms of capacity or pump? Or does it require changes?

Mr. D'ANGELIS. Senator, it requires absolutely no change in that there is nothing in any of the—basically, the reformulated gasolines we have seen now substitute something like MTBE a la EC-1 for the benzenes and zylenes. There is no change necessary.

Senator LIEBERMAN. Thank you. I thank you both for your testimony.

Mr. D'ANGELIS. Thank you.

Mr. WILLINGHAM. Thank you.

Senator BAUCUS. Thank you all very much. It has been very helpful.

The hearing is adjourned.

[Whereupon, at 2:18 p.m., the subcommittee was adjourned, to reconvene at the call of the Chair.]

[Statements submitted for the record follow:]

TESTIMONY OF
WILLIAM G. ROSENBERG
ASSISTANT ADMINISTRATOR FOR AIR AND RADIATION
U.S. ENVIRONMENTAL PROTECTION AGENCY
BEFORE THE COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS
UNITED STATES SENATE

January 11, 1990

Mr. Chairman and Members of the Committee, I am very pleased to have the opportunity to discuss with you the clean alternative fuels program which the President has included in his comprehensive Clean Air Act Amendments of 1989. The Administration is hopeful that this Committee, after hearing testimony today, will fully understand the substantial environmental benefits that can be achieved from cleaner-burning motor vehicles fuels. We strongly encourage the Committee to draft legislation to implement a clean fuels program and offer it as a Committee-sponsored amendment to S.1630 on the Senate floor.

My testimony will cover four basic themes. First, I'll present a brief discussion of background information on the problem of poor air quality in many of our cities and, specifically, the role of motor vehicles and fuels in that problem. Second, I'll describe how the clean fuels program is a vital and integral part a comprehensive mobile source control program. Next will be a presentation of the environmental benefits of clean fuels as compared to very stringently controlled gasoline cars. Finally, I'll discuss how the President's clean fuels program is workable, technically feasible and cost-effective.

Let's begin with a summary of the Nation's nonattainment situation. You are all aware that ozone is our most serious urban air quality problem. While the stratospheric ozone layer protects human life by filtering out ultraviolet radiation, ground-level ozone has been shown to impair lung function and damage lung cells. Based on data from 1986 to 1988, 101 urban areas exceed our health standard for ozone. And unfortunately, many of these areas will not reach compliance without stringent additional control programs.

Ozone is not emitted directly, but is a product of a series of complex atmospheric reactions involving hydrocarbons, nitrogen oxides, and sunlight. Motor vehicles are important sources of both hydrocarbons and nitrogen oxides, and our motor vehicle emission control program has achieved considerable success in reducing these pollutants. Compared to an uncontrolled passenger car in the 1960's, a car produced today will emit approximately 80 percent less hydrocarbons and 60 percent less nitrogen oxides during its lifetime. Unfortunately, however, much of this impressive per vehicle emissions reduction has been offset by the continual growth in number of motor vehicles and number of miles these vehicles travel (CHART 1).

EPA believes that for most urban areas hydrocarbon control is the most promising strategy for reducing ozone levels (in some areas, EPA encourages nitrogen oxide reductions as well). Even with the large emissions reductions of the last two decades, motor vehicles still account for 40 to 50 percent of all urban hydrocarbon emissions (CHART 2). Any comprehensive solution to our widespread ozone problem must involve major reductions in vehicle hydrocarbon emissions.

A second important urban air quality problem is toxic air pollution. Toxic air pollution involves a large number of different compounds emitted by a variety of sources. Motor vehicles account for approximately 50 percent of all toxic air problems (CHART 3). Data recently released by EPA indicate that 2.7 billion pounds of toxic chemicals are emitted into the air each year from large stationary sources. Our upper-bound estimate is that total toxic emissions contribute to approximately 1500 to 3000 fatal cancers annually. Air toxics can also be associated with respiratory disease and birth defects. The most important air toxics from vehicles include particulate matter, benzene, and butadiene.

Our proposed Clean Air Act Amendments address ozone and toxic air pollution in a three-step process (CHART 4). First, there are several control programs that can begin to take effect almost immediately. These include further control of gasoline volatility, the use of oxygenated fuels, improved inspection and maintenance programs, the control of refueling emissions, and the use of clean alternative fuels in transit buses. Second, there are several regulations that we will be able to promulgate fairly quickly but that won't begin to provide major emissions reductions until the mid 1990s. These include, for example, tighter vehicle tailpipe standards, improved evaporative emission controls, and off-highway vehicle emission standards. We believe the combination of the standards we already have on the books and these that we are proposing will bring some of our high ozone areas into compliance by the late 1990's.

But many cities will need further reductions of hydrocarbon emissions in order to ultimately comply with our ozone standard. With gasoline vehicle emission controls becoming very expensive and approaching the technological limit, there are only two basic options. The first would be to restrict automobile use in certain areas. We do not believe the substantial use restrictions that would be required are appropriate or feasible in terms of national regulations. The second option would be to switch to inherently cleaner fuels.

There are several vehicle fuels that are inherently cleaner than current gasoline, such as ethanol, methanol, natural gas, propane, and electricity. We project that each of these fuels could provide approximately an 80 percent or greater reduction in ozone-forming hydrocarbon emissions relative to a gasoline vehicle meeting stringent future emission standards (CHART 5). These large emission reductions are due to two primary reasons. First, each of these fuels yields inherently low evaporative hydrocarbon emissions -- methanol and ethanol because of extremely low volatilities and natural gas and propane because they are stored in sealed fuel tanks on-board the vehicle. Second, the hydrocarbon emissions from these fuels, almost exclusively in the exhaust, are much less photochemically active, i.e., much less likely to form ozone, than hydrocarbon emissions from gasoline vehicles.

These fuels would also provide large reductions in cancer incidences from toxic air emissions as well, on the order of 90 percent or more relative to gasoline vehicles (CHART 6). The major toxic pollutants from gasoline are due either to compounds purposely added to gasoline to increase octane, such as aromatics, which lead to benzene emissions, or to partial combustion of large and complex gasoline compounds, which lead to a number of toxic compounds such as butadiene. Cleaner fuels such as methanol, ethanol, natural gas, and propane are simpler compounds that do not yield complex by-products or need toxic additives to increase octane.

In order to permit us to reap the emission benefits of these clean alternative fuels, federal requirements are necessary at this time. We believe an appropriate federal program must satisfy the following criteria: 1) the program should be fuel neutral, 2) there must be a match between vehicle and fuel supply, 3) fuel must be conveniently available to consumers, 4) the size of the program must be large enough to permit the utilization of economies of scale with both vehicle and fuel production, 5) the program should be temporary, just long enough to solve the chicken and egg problem of market entry which will allow the new fuel to truly compete with the conventional fuel, and 6) the program should rely on market forces as much as possible.

We believe the proposed clean alternative fuels program satisfies each of these criteria. I would like to briefly summarize our proposal.

The program requires that the most polluted metropolitan areas of 250,000 people or more with ozone levels of 50 percent or more above EPA's health-protective ozone standard be included in the clean alternative fuels program. Based on the most recent ozone data, the following nine cities would be included: Los Angeles, Houston, New York City, Milwaukee, Baltimore, Philadelphia, Hartford, San Diego, and Chicago (CHARTS 7 and 8). Automobile manufacturers would be required to produce, distribute, and offer for sale 500,000 clean alternative-fueled vehicles in 1995, 750,000 such vehicles in 1996, and 1,000,000 clean alternative-fueled vehicles in each year from 1997 through 2004. Vehicles would qualify as clean alternative-fueled vehicles if their emissions met the emission standards that EPA would establish by a rulemaking process. Hence, automobile manufacturers are free to offer for sale any combination of fuel and vehicle technology that meets the standards. EPA would then require the availability of the fuels needed by these vehicles. High-volume service stations in these 9 areas would be required to offer at least one clean alternative fuel for sale beginning in 1995. Under the SIP plan, States with affected metropolitan areas would ensure the effectiveness of the clean alternative fuels program. In addition, EPA would retain the authority to extend the fuel availability requirement to major nationwide corridors when vehicles dedicated to clean alternative fuels began emerging. Market incentives are provided throughout the program in order to maximize flexibility and effectiveness: individual cities can opt into or out of the program, or include more vehicles, if certain conditions are met. Automobile manufacturers and fuel suppliers can meet their requirements through emissions trading and banking and fuel pooling as long as the hydrocarbon and toxics emissions reductions are equivalent to those that would have been achieved with the clean alternative fuels programs. Trading, banking and fuel pooling would allow for greater flexibility while achieving the same environmental benefits at lower cost.

In a separate requirement, clean alternative fuels would be phased-in for new transit buses in metropolitan areas of 1,000,000 population or more based on the following schedule: 10 percent of sales in 1991, 25 percent of sales in 1992, 60 percent of sales in 1993, and 100 percent of sales in 1994 and later model years.

The size of this overall clean alternative fuels program has been designed to be large enough to permit economies of scale to be utilized in vehicle and fuel production, but not so large as to cause economic dislocations. For example, by 1997 EPA estimates that clean alternative-fueled vehicles would account for about 7 percent of automobile and light truck sales nationwide, but approximately 30 percent of sales in the affected urban areas. And fuel demand would grow quickly in those areas so that by three years into the program clean alternative fuel demand at high-volume service stations would be approaching the level of premium unleaded gasoline. Fuel demand would not grow so rapidly as to diminish petroleum demand, however. Overall petroleum demand, even in the affected cities, would actually grow somewhat as the clean alternative fuel demand would simply offset growth that would otherwise occur in petroleum demand (CHART 9).

I would like to focus briefly on one specific air pollutant -- formaldehyde -- that has received much attention. Formaldehyde is both an ozone-forming hydrocarbon as well as a toxic air pollutant, and so has been accounted for throughout our air quality analyses. Formaldehyde is generated by the combustion of all fossil fuels (gasoline as well as methanol) but, as we have reported, methanol combustion yields higher levels of formaldehyde than the combustion of gasoline. Thus, many are concerned that ambient formaldehyde levels could increase with methanol usage. Actually, we do not expect that this will be the case, for the following reason. Motor-vehicle-related formaldehyde is generated in two different ways: emitted directly through the tailpipe and indirectly as the product of reactive hydrocarbons and atmospheric photochemistry. Compared to gasoline-fueled vehicles, methanol-fueled vehicles generate more of the "direct" kind of formaldehyde, but far less of the "indirect" kind. Therefore, overall, it appears to EPA that overall ambient formaldehyde levels would remain nearly constant, or even decrease, if methanol vehicles were to replace gasoline vehicles (See Chart 6). In addition, direct formaldehyde emissions from methanol vehicles can be controlled to levels comparable to those from gasoline vehicles if necessary.

It is critical at this juncture to point out that one of the principal goals of the President's program is the reduction of toxic benzene exposure due to the high volume of aromatics in gasoline. Exposure from motor vehicle benzene emission accounts for 80 percent of the total benzene risk, and more than one fourth of all air toxic risks from gasoline vehicles. One way to deal with this problem is the use of alternative fuels. In addition to the use of alternative fuels, EPA is exploring standards for gasoline under current authority.

Of course, the clean fuels program cannot succeed unless it works for consumers. Consumers must be willing to purchase clean alternative-fueled vehicles and operate the vehicles on the clean alternative fuels. We recognize that there could be consumer reluctance if the program results in cars with poorer performance or less dependability. For this reason, the program has been designed to minimize consumer concerns. The program will permit the use of flexible or dual fuel vehicles in the early years (CHART 10). Those vehicles are expected to look like and perform as well as, if not better than, dedicated gasoline vehicles. Since only a few parts must be added or changed to convert a gasoline vehicle to a dual fuel vehicle which can operate on any combination of gasoline and alternative fuels, dependability will be unchanged. And, since gasoline can always be used, the buyer of a flexible fuel car need not worry about fuel availability or price. Some consumers would likely be attracted to the very low emissions of these vehicles because the car will be less polluting, but it is likely that many more consumers will be attracted by the better energy efficiency and acceleration performance of clean alternative-fueled vehicles. It must be noted that there is nothing exotic about the use of alternative fuels in motor vehicles. Ethanol is currently Brazil's primary vehicle fuel. Propane is used in several countries such as Japan, Italy, and the U.S. Compressed natural gas is used widely in Italy and New Zealand. Methanol is used in Indianapolis-type racing cars as well as in the many demonstration programs now underway in the U.S. Finally, since automobile manufacturers would be required to manufacture and offer the vehicles for sale, they would have every reason to design, promote, and price clean alternative-fueled vehicles in a manner so as to ensure the desired sales volumes.

Consumers will have assurance of convenient fuel availability, just as they did with the successful transition to unleaded gasoline in the 1970's. The combination of the federal requirement that high-volume service stations provide clean alternative fuel for sale and the State's role to ensure that alternative fuel is attractive to the consumer, should provide the needed public confidence. With convenient fuel availability, consumers should be very willing to purchase clean fuels given their higher octane and improved performance (CHART 11). Alternative fuels are now priced competitively with gasoline and we would expect this situation to improve as alternative fuel demand increases providing for production and distribution economies of scale (CHART 12). If necessary, States could adopt a wholesale fuel sales requirement similar to that imposed on motor vehicle manufacturers to ensure that clean fuels are promoted and priced to ensure their use.

EPA is now devoting serious attention to the health and safety implications of the various clean fuels. The fuel that has received the most scrutiny to date in this regard is methanol. Because of the differences in the physical and chemical properties, the human health and safety risks of methanol are different but not necessarily greater than those of gasoline (CHART 13). In fact, it is important to keep in mind the hazards of gasoline. Chart 14 shows the health warning that is currently affixed to most gasoline pumps across the nation.

Methanol appears to be less of a hazard than gasoline in terms of inhalation. Unlike gasoline, methanol contains no carcinogenic substances and, as already discussed, its emissions by-products involve fewer toxic substances. In a thorough review, the Health Effects Institute concluded that "exposure to methanol vapors is not likely to cause adverse health effects." HEI and EPA continue to support further research and testing, particularly with respect to chronic exposure to low levels of methanol.

Methanol is more of a hazard in terms of ingestion, however, and precautions will be necessary to prevent accidental ingestion, such as through fuel siphoning. It is likely that an inexpensive additive can be used to give methanol a distinctive odor and unpleasant taste. Also, simple anti-siphoning devices can be easily installed in autos designed to use methanol. With respect to vehicle and fire safety, methanol fires are much less likely to occur. When one does occur, it burns less violently than a gasoline fire. The one concern is the invisible flame of a methanol fire in bright sunlight, but research is ongoing to develop an additive for luminosity.

As you may be aware, EPA has committed to a series of reports detailing the environmental and economic impacts of the various clean alternative fuels. We have already published the report on methanol, and we are now in the process of preparing similar reports on ethanol, natural gas, propane, and electricity. We hope to begin a similar report on reformulated gasoline when more information becomes available.

I would like to say a few words about EPA's perspective on the merits of the different clean fuels. Some have criticized EPA for being "pro-methanol" and the clean fuels program for being a "methanol mandate." This is simply not true. The clean fuels program is fuel and technology neutral; any fuel-vehicle combination (for example, CNG, reformulated gasoline, methanol, ethanol, LPG) that can meet the cleaner emission performance standards can be sold.

It is important to emphasize that gasoline itself may qualify if reformulated in a way to produce sufficient reductions in reactive hydrocarbons. This will mean a large reduction in aromatics, some of which are highly reactive as well as toxic, and an increase in oxygenates or ethers, such as ethanol, MTBE or ETBE, to provide a cleaner octane substitute. Because these components also reduce carbon monoxide, it is entirely possible that the marketplace could produce a hybrid fuel that satisfies in one stroke three separate objectives: reductions in CO, VOC's, and toxic air emissions. In sum, we believe there probably will be more than one fuel used in the clean fuels program, but, of course, that decision will rest with the marketplace. I can assure you that EPA will carry out its responsibilities in a fair and impartial manner.

In closing, I would like to refer to the results of a recent public opinion survey that was summarized in USA TODAY (Chart 15). Of 1,000 adults surveyed, 68 percent said carmakers should be required to build cars that run on alternative fuels. Equally important, over 50 percent said they would be willing to pay extra for such a car.

Thank you for this opportunity to meet with you and discuss these important issues. I will be pleased to answer any questions that you might have.

CHART 1

What Are We Up Against?

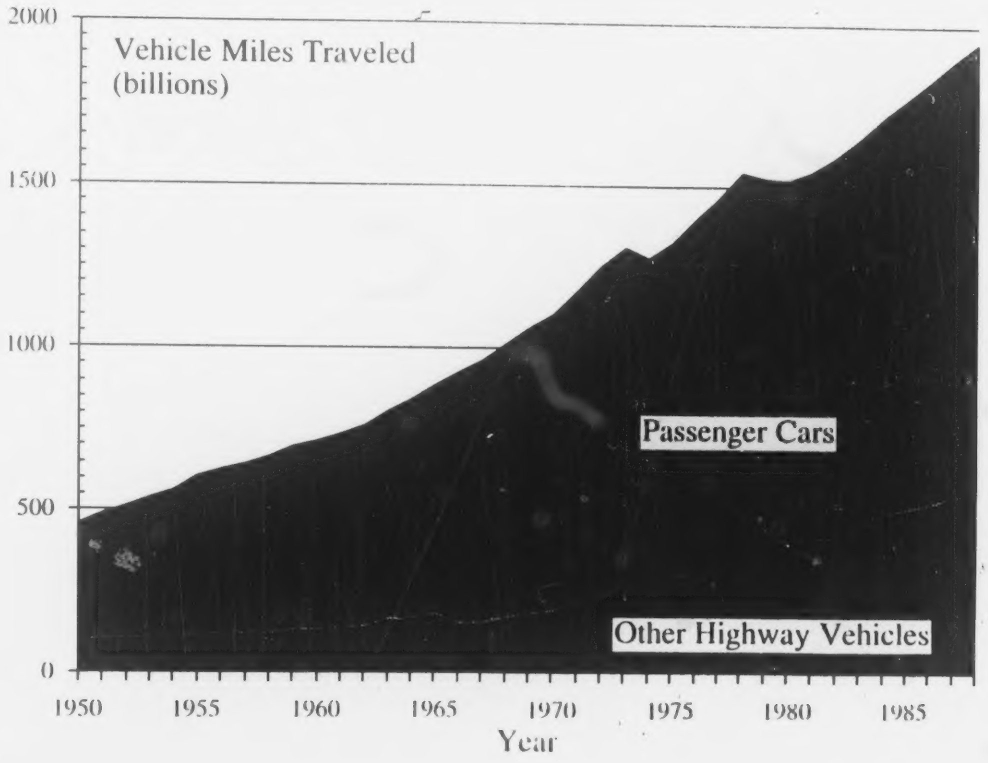
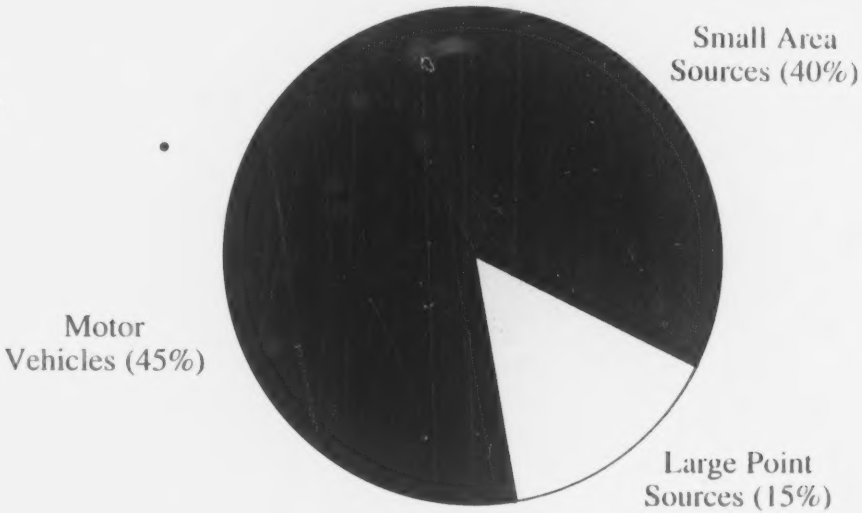


CHART 2

Motor Vehicles Contribute a Large Portion of Urban Hydrocarbon Emissions



Control Options:
- Motor Vehicles
- Small Sources such as Dry Cleaners, Bakeries, and Printers
- Driving Restrictions
- Factories and Other Large Sources

Alternative Fuels Provide Large Reductions at Low Cost

CHART 3

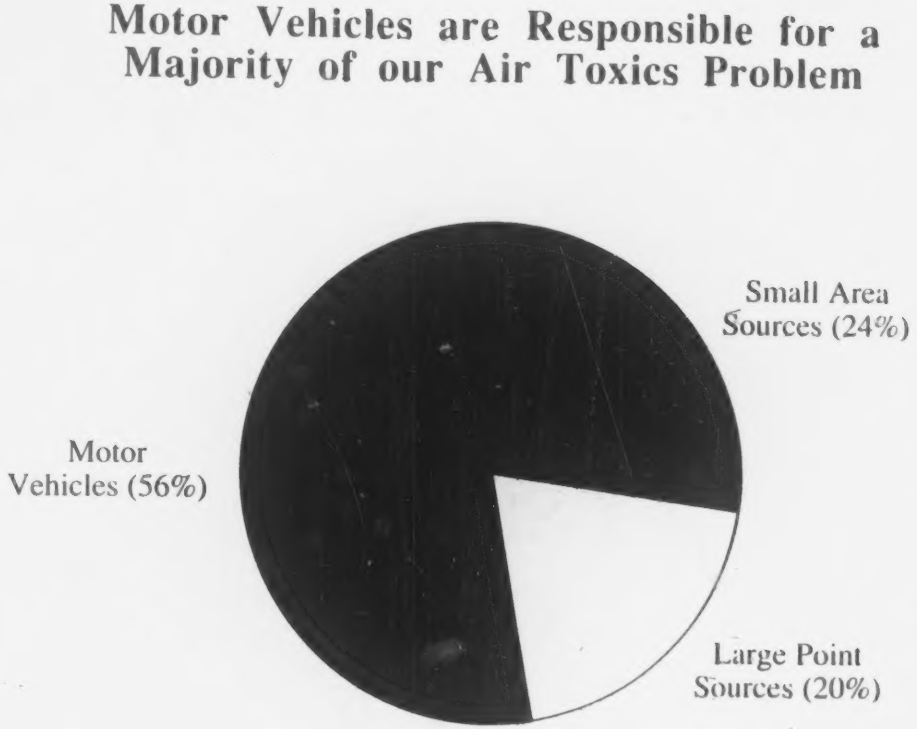

Motor Vehicles are Responsible for a Majority of our Air Toxics Problem
Small Area Sources (24%)
Large Point Sources (20%)
Motor Vehicles (56%)

CHART 4

MOBILE SOURCE CONTROLS: THE PRESIDENT'S PROPOSAL

Near Term	Mid-1990's	Post-2000
Gasoline Volatility	Vehicle Evaporative Control	Advanced Clean Fuels
Oxygenated Fuels	Tighter Tailpipe Standards	
Enhanced Inspection and Maintenance	Cold Temperature CO Standards	
Refueling	Diagnostics	
Clean Fueled Buses	Non Road Engines & Fuels	
	I/M Certification Tests	
	Diesel Fuel Controls	
	Clean Fuels	

CHART 5

THE PRESIDENT'S PROPOSAL GREATLY REDUCES PER CAR EMISSIONS

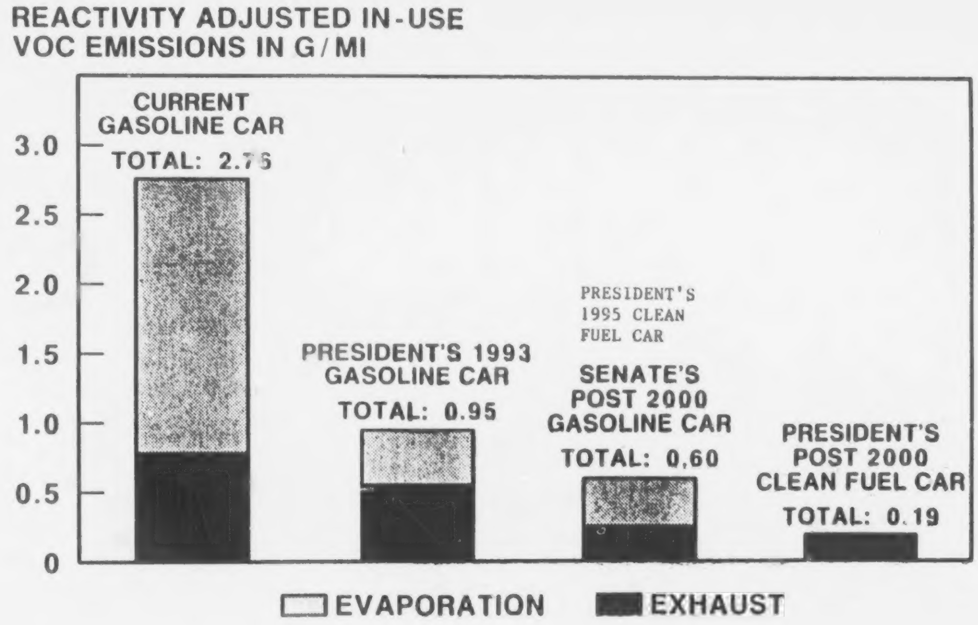


CHART 6

Air Toxics Impact of Clean Fuels

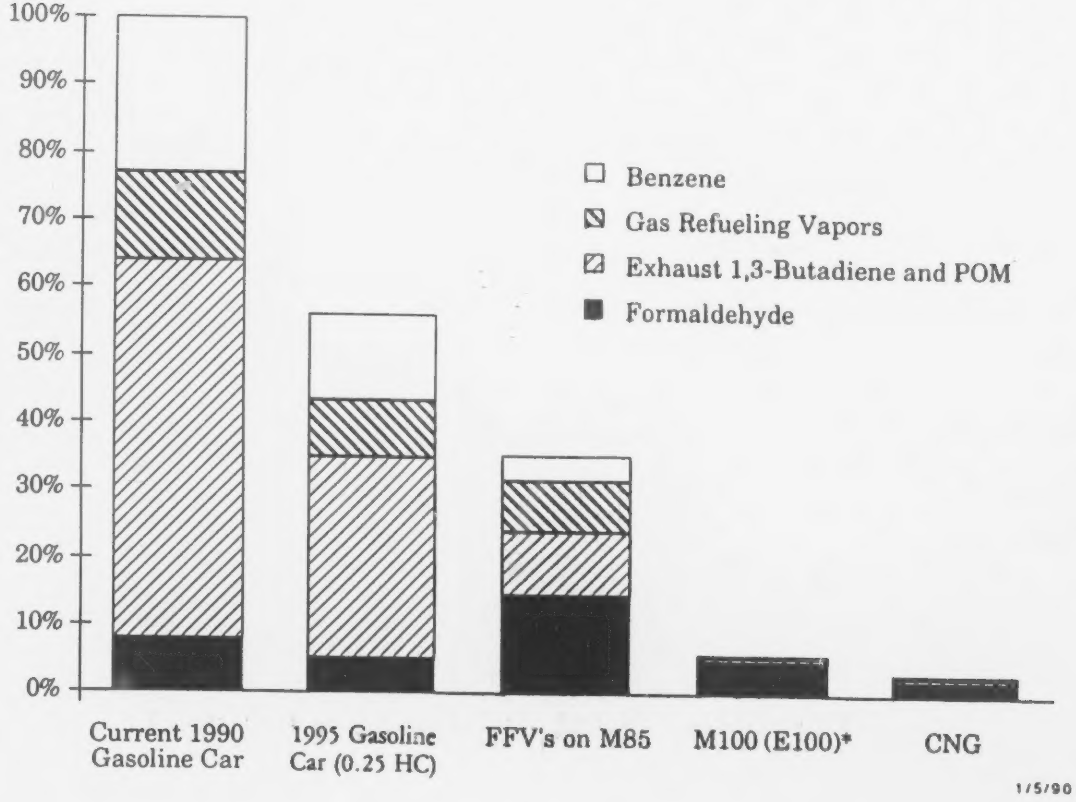


CHART 7

President's Program Will Affect Our Dirtiest Cities

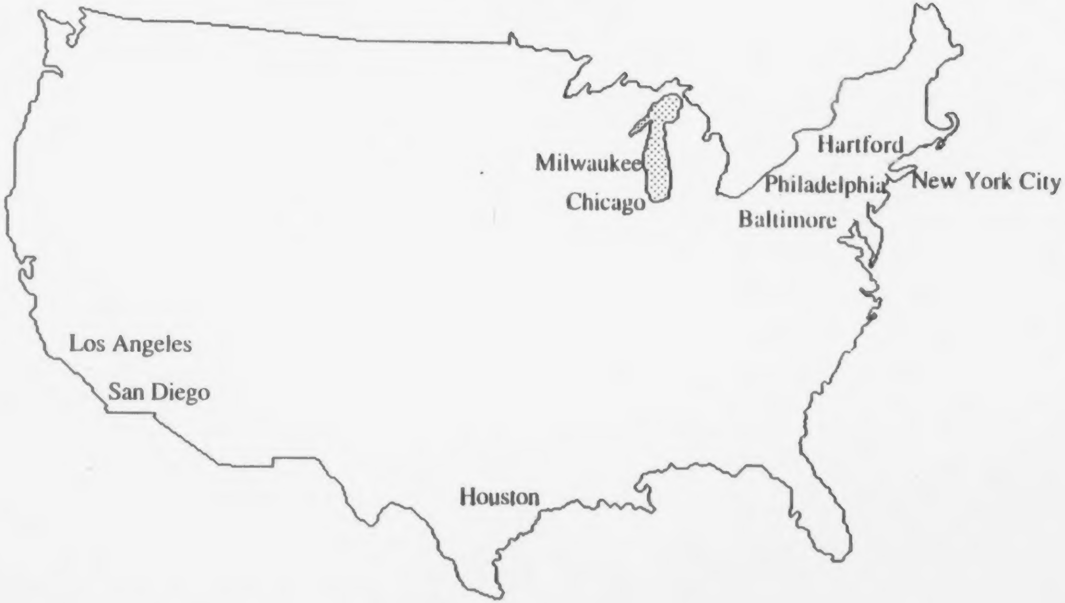

Milwaukee
Chicago
Hartford
Philadelphia
New York City
Baltimore
Los Angeles
San Diego
Houston

CHART 8

The President's Clean Fuels Program is Fuel and Technology Neutral

- 30 Percent of New Vehicles in Dirty Areas Must be Much Cleaner than Other New Vehicles.
- EPA will Promulgate Emissions Performance Standards:

	% Reductions	
	1995	2000
Hydrocarbons	30	80
Toxics	40	90

- Market Based: Industry is Challenged to Meet Standards in the Most Cost-Effective Manner -- Any Combination of Engine and Fuel.
- EPA will Assure that Fuels Match Cars.
- Similar to Introduction of Unleaded Gasoline in the 1970's.

CHART 9

Projected Highway Fuel Consumption
Nine Affected Urban Areas

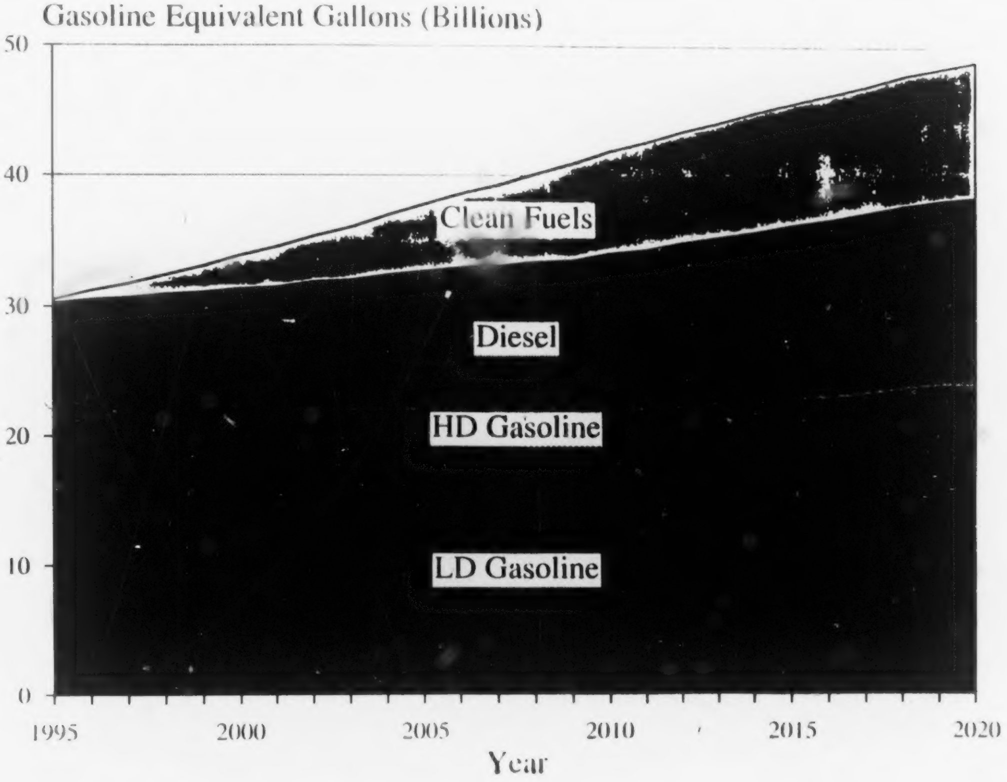


CHART 10

Will Consumers Buy Clean Alternative-Fueled Vehicles?

- Program is Designed to Minimize Consumer Reluctance.
- Initial Vehicles will be Flexible Fuel or Dual Fuel Vehicles.
    - Few changes from gasoline-only vehicle
    - Can operate on gasoline
    - Should perform better on clean fuels
- Fuel will be Conveniently Available.
- Automakers will Design, Promote, and Price Vehicles to Ensure that Required Number of Vehicles are Sold.

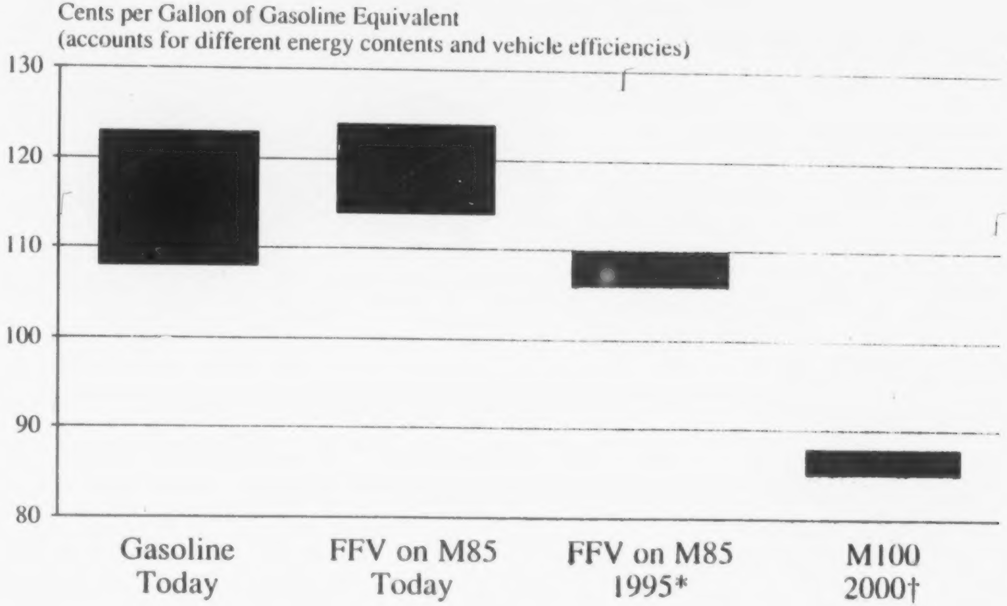
CHART 11

Will Consumers Buy Clean Alternative Fuels?

- Considerable Experience with Clean Fuels in U.S. and Around the World.
- Federal Requirement will Ensure that Clean Fuels are Conveniently Available in Dirty Cities.
- Clean Fuels are Premium, High Quality Fuels Offering Improved Performance.
- Clean Fuels are Projected to be Price-Competitive; If not, States Could Adopt Fuel Sales Requirements Similar to Auto Sales Requirement.

CHART 12

EPA's Methanol Report Shows Fuel and Vehicles to be Economical



* FFVs projected to cost $300 more than gasoline vehicles.

† Dedicated M100 vehicles projected to be equal in cost to gasoline vehicles.

CHART 13

Health and Safety Risks of Methanol are Different, but Generally Less Than Those of Gasoline

- Toxicity
    - Methanol vapors are not carcinogenic.
    - Health Effects Institute concluded that inhalation of methanol vapors "should not prevent government from encouraging the development and use of methanol fuels, assuming [this is] in the public interest."
    - Methanol is highly toxic if ingested; precautions necessary to minimize occurrence.
- Safety
    - Methanol fires much less likely and much less severe.
    - Additives being studied to provide flame color, taste, and odor.

CHART 14

Health Warning

Use As A Motor Fuel Only

Harmful or Fatal if Swallowed

Long-Term Exposure to Vapors Has Caused Cancer in Laboratory Animals

- Avoid Prolonged Breathing of Vapors
- Keep Face Away From Nozzle and Gas Tank
- Keep Away From Eyes and Skin
- Never Siphon By Mouth

Failure to Use Caution May Cause Serious Injury or Illness

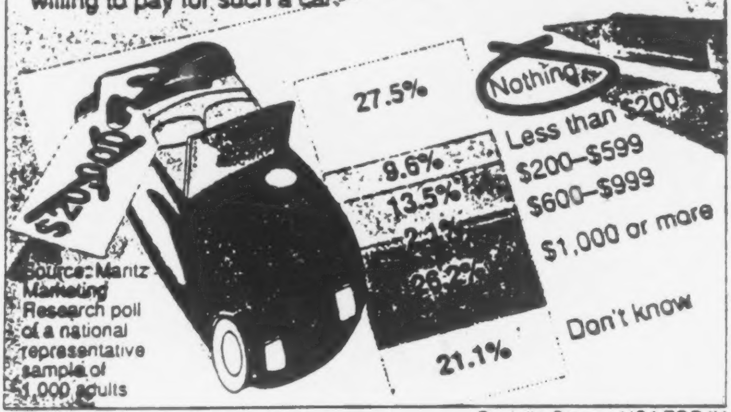
CHART 15

USA SNAPSHOTS®

A look at statistics that shape your finances

Drivers want fuel choices

68% of consumers say carmakers should be required to build cars that run on alternative fuels. How much more they're willing to pay for such a car:



Source: Maritz Marketing Research poll of a national representative sample of 1,000 adults

By Julie Stacey, USA TODAY

-- USA TODAY Nov. 7, 1989

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TESTIMONY OF

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Senior Associate

Climate, Energy, and Pollution Program

Before the

Subcommittee on Environmental Protection

Committee on Environment and Public Works

United States Senate

January 11, 1990

HIGHLIGHTS OF TESTIMONY

- The only alternative fuel proposals that can be implemented in the near future are based on the use of fossil fuels. Because of global warming and the need to control carbon dioxide emissions, such fuels will ultimately lead to dead ends. Efforts to *widely* introduce alternative *fossil* fuels would divert precious time and resources into paths that would ultimately have to be abandoned. The widespread introduction of these fuels should be avoided.

- Despite assurances of fuel neutrality, the Administration has as its goal the widespread introduction of methanol. This methanol will be made from natural gas and will be imported. Yet, according to EPA, methanol will offer few air quality benefits over the coming decades. Moreover, its use promises little or no enhancement of national or economic security, and would not reduce national carbon dioxide emissions.

- Air pollution problems are best approached through an integrated long-term strategy that also addresses the national threats from rising oil imports and global warming:

  - Over the next 10-15 years, the United States should reduce carbon dioxide and air pollution emissions through improved car and truck fuel efficiency, tighter vehicle pollution standards, cleaner (reformulated) gasoline, stricter Inspection and Maintenance programs, the removal of old, inefficient, and polluting cars from the road, and reductions in traffic (vehicle miles traveled). A *limited* use of CNG and/or methanol in urban buses and heavy duty trucks might also help reduce urban smog and particulate pollution.

  - In the longer term, the U.S. needs to develop radically different transportation energy sources *that are not based on fossil fuels*. The most attractive fuel choices at present are hydrogen and electricity, both of which could eventually be obtained from solar and/or nuclear energy sources.

- U.S. automakers must recognize that their long-term future rests not with conventional or "alternative" fossil fuels, but with these intrinsically clean energy sources that will simultaneously address all three of our national problems. The pressures to develop these inherently clean vehicles will increase with efforts to control global warming. The U.S. auto industry cannot ignore these challenges if it wishes to remain competitive.

Mr. Chairman and members of the Committee, my name is James J. MacKenzie and I am a Senior Associate in the Climate, Energy, and Pollution Program at the World Resources Institute here in Washington. WRI is a non-profit, policy research center. I would like to thank you for inviting me to testify today on the role of alternative motor fuels. The views that I present here today are my own.

BACKGROUND

The present focus on alternative automotive fuels derives primarily from environmental concerns: it is hoped that their introduction will reduce levels of urban smog and carbon monoxide. In his June clean-air message, President Bush threw his support behind the so-called "clean fuels" to reduce urban automotive air pollution. The two fuels receiving the most attention from EPA are methanol and natural gas. There are, though, other candidate fuels including so-called reformulated gasoline, ethanol, propane, electricity, and hydrogen.

Although the federal government professes to take a neutral position on these various fuels, it is no secret that EPA officials are enthusiastic supporters of methanol. Officials of the California Energy Commission are also staunch promoters of methanol. As a result, methanol is presently the leading contender in the President's program to introduce 10 million alternatively fueled vehicles over the next decade and a half.

For this reason I would like to address myself first to this fuel.

METHANOL -- SUMMARY

Despite current enthusiasm, there are a number of sound reasons for avoiding a large-scale program to introduce methanol into our transportation system.

o First, even with optimistic assumptions about the performance of methanol vehicles, the clean air benefits of widespread methanol use would in fact be quite small.

o Second, providing large amounts of methanol would entail significant risks, whatever the source. If domestic coal were used as the methanol feedstock, increases of 80 percent in carbon dioxide emissions per vehicle mile traveled would result, relative to comparable gasoline powered cars. The alternative to coal -- using natural gas to make the methanol -- would be far cheaper but require dependence on foreign sources, offering little or no relief from the financial and security risks presently posed by imported oil.

o Third, a large scale methanol effort would waste precious time and resources on fossil fuel based technologies that -- because of the global warming problem and the need to drastically reduce carbon dioxide emissions -- would ultimately prove to be dead ends.

METHANOL ISSUES

Let me expand on several of these points. Current proposals by both the California and federal governments would introduce methanol through the use of flexible or dual fuel vehicles capable of burning methanol-gasoline blends ranging from pure gasoline to M85, a mixture of 85 percent methanol and 15 percent gasoline. These vehicles would be manufactured and sold over the coming years if President Bush's proposal is adopted. Automobiles operating on pure methanol (known as M100) are not now being considered for manufacture because they present a number of significant obstacles. For example, they are difficult to start at temperatures less than 40 to 50 F. More importantly, they could not be sold until there was a national network of service stations capable of supplying 100 percent pure methanol. Without such a network the cars would be restricted to drive within a local area where fuel for them was available, a major deterrent to their introduction. As a result, EPA's commitment to M100 vehicles is in effect a commitment to nationwide use of these vehicles.

Air Quality Impacts. Several studies have been completed on the expected air quality impacts of methanol vehicles. In a 1987 report to the Vice President's Task Force on Alternative Fuels, EPA estimated the reductions in ozone levels that would occur in New York, Washington, D.C., and Los Angeles by introducing current and advanced technology methanol vehicles.[1] Using optimistic assumptions on methanol vehicle emissions, EPA concluded that replacing 15 to 26 percent of vehicle miles traveled (VMT) with current-technology methanol vehicles would reduce ozone levels by less than 2 percent. Advanced methanol technology would lead to reductions of only 3 to 5 percent compared with levels resulting from conventionally powered vehicles.

In September 1989, in connection with President Bush's clean air proposals, EPA released its latest assessment of the air quality impacts of methanol use.[2] The agency assumed that, under President Bush's clean air proposals, flexible fuel vehicles would be sold in the 1995-1999 period followed by dedicated M100 vehicles (which currently do not exist) thereafter. Even with optimistic assumptions on the emissions from methanol vehicles, EPA concluded that the air pollution benefits would be very small. Under the President's program, EPA concluded, hydrocarbon ozone precursors in the year 2005 would be reduced by an average 1.5 percent in nine of the nation's more polluted cities. By the year 2015, the "maximum benefit," assuming the introduction of pure (and presumed cleaner) methanol vehicles beginning in the year 2000, would be an average reduction of only 3.3 percent. Other studies suggest that in the Los Angeles basin the benefit could reach 5 percent reductions in peak ozone levels (relative to present peak levels) if half the cars were flexible fueled and actually ran on M85. (The emissions from flexible fuel vehicles running on various gasoline-methanol mixtures are uncertain at this time.)

The small expected impact on smog levels from methanol vehicles is largely the result of an expected diminishing role of transportation in smog formation, this the consequence of ever cleaner conventionally powered vehicles.

There are considerable uncertainties surrounding the estimated clean air benefits. These stem primarily from the uncertainties associated with the future emissions of both methanol and gasoline powered cars. The M85 methanol vehicles are still under development and according to data from the California Air Resources Board will need considerable work to reduce their formaldehyde and nitrogen oxide emissions. The emissions from gasoline cars are also subject to further reductions from both technological improvements and from the reformulation of gasoline.

Cost Effectiveness of a Methanol Program. Reducing ozone using methanol appears to be quite costly compared with other options. A July 1989 report by the Office of Technology Assessment gave a mean value of $30,000 per ton of hydrocarbons removed from the ambient air using methanol.[3] (EPA generally assumes a one-for-one change between hydrocarbon emissions and resulting ozone levels.) This is to be compared with costs of $1,000 to $5,000 per ton for a range of other technologies such as limiting gasoline volatility ($500 per ton), capturing vapors with special fuel pumps at filling stations ($1000 per ton), or strengthening inspection and maintenance programs ($4000 per ton). According to OTA, "...by far the most expensive [method to reduce ozone levels] is replacing gasoline with methanol, at $8,700 to $51,000 per ton of reductions."[4]

National Security Impacts Methanol supporters claim that there could be benefits to national security from the introduction of methanol in place of gasoline. This is not at all clear. The President's alternative fuel proposal called for the introduction of about 10 million vehicles over ten years. These would displace about 325,000 barrels per day of gasoline. That would amount to less than 2 percent of current U.S. oil use and far less than 1 percent of current total world oil demand. It seems doubtful that a program of this modest size would have any significant impacts on world oil markets.

There appears to be plenty of natural gas in the world for feedstock to make methanol for some time. And there seems to be a consensus that coal would be far too expensive to serve as a feedstock. Together these mean that a U.S. methanol program would be based on imported methanol. It is clear that the very expensive facilities needed to supply this methanol won't get built without some assurance that there will be a demand for the resulting fuel. The obvious question arises: why would individuals buy methanol cars? When fueled with methanol, these cars would have about half the range of gasoline vehicles. Performance benefits would be so small as not to be noticeable. The first cost of the cars would be greater by perhaps $300. And at present no one knows how the costs of gasoline and M85 would compare. Estimates suggest that the price of methanol could range anywhere between that of gasoline (for the equivalent driving range) up to $.25 more per gallon of gasoline equivalent. The answer to consumer reluctance to purchasing these cars, I suspect, will be government regulation. Fleet owners will likely have to be mandated to buy methanol cars and then prove to the government that they are using methanol fuel in them.

A methanol program is unlikely to lead to any reduction in the country's energy import bill. There will be no enhancement in U.S. economic security. If EPA has its way, Detroit would soon be building and selling M100 cars for their presumed clean air superiority. But cars running on pure methanol would not be able to switch back and forth between fuels and as a result much of the presumed fuel-switching benefit for national security would not materialize. If instead we rely on M85 for security benefits then the potential clean air benefit would be cut in half.

In any case, potential security benefits seem small. If the United States introduces M100 vehicles and methanol supply is roughly in equilibrium with demand -- recall that methanol plants will be large and expensive and there will be little incentive to build plants for which there is no clear need -- we would have no response to a methanol embargo. If we build M85 vehicles it is conceivable that there could be some security benefit *if* world oil capacity were sufficiently large to allow switching *and* the embargo did not include simultaneous producers of both methanol and oil.

Where would the methanol come from? About 87 percent of the world's exportable surplus natural gas reserves are in OPEC or the Soviet Union.[5] It is at least debatable that the security risks of importing methanol from these sources would be acceptable to the United States. Presumably, the risks would depend on the size of the program. A very small import program might pose few security risks but also bring few benefits.[1] A large-scale effort would be another matter. The response of methanol advocates to the security argument is that there are still potential sources of methanol not in the eastern or OPEC blocs that would provide diversity, and therefore security, of supply.

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[1] There is a close analogy here with U.S. dependency on imported oil. As in the case of natural gas, about 84 percent of world oil reserves are in either OPEC or Eastern-bloc countries. Because U.S. imports are so large, however, (40 percent of supply in 1988) more than 20 percent of total U.S. oil supply arises from OPEC sources, with a consequent jeopardy to U.S. national security.

Maybe so. But there is a point here that is generally overlooked. The nations of the world will soon be entering into prolonged, difficult negotiations on a global climate convention and protocol with the goal of reducing emissions of greenhouse gases, including carbon dioxide. Natural gas is the fossil fuel with by far the lowest carbon dioxide emissions per unit energy and could well become a highly valued, premium fuel in these negotiations. There is no telling what kinds of international agreements will be reached in efforts to reduce carbon dioxide emissions. But one should not automatically assume, as global warming moves ever more to the forefront, that low-cost natural gas will be available from these countries to satisfy the United States' ever growing appetite for transportation fuels.

COMPRESSED NATURAL GAS

Let me turn briefly to other candidate fuels. Compressed natural gas (CNG) is the other fuel being considered to reduce air pollution. Unlike methanol, CNG is already in use as a motor fuel in other countries, including Canada. There is a great deal of experience with its use in fleets. CNG vehicles have much lower emissions of carbon monoxide, hydrocarbons, and particulates. Emissions of nitrogen oxides are less certain; in some test vehicles NOx emissions have increased, in others they have decreased. The principal problems posed by CNG vehicles are the bulky tanks for storing the gas, especially in automobiles, and the absence of a network of compressors for refueling. Safety, on the other hand, does not appear to be a significant obstacle to the use of CNG vehicles; experience to date has been quite reassuring.

Natural gas is, of course, a fossil fuel and its use therefore leads to carbon dioxide emissions. Per vehicle mile traveled, CNG cars emit less carbon dioxide than either gasoline or methanol powered cars, perhaps 15 percent less.[2] Heavy duty vehicles powered by CNG emit about the same carbon dioxide as diesel powered vehicles. Obviously, CNG vehicles are not in themselves an answer to the global warming problem. They do represent, nonetheless, an option for using domestic energy sources (CNG) to greatly reduce pollution emissions from buses and trucks in urban areas. In this niche, CNG vehicles could make an important though, ultimately transitional, contribution to reducing the risks of global climate change, air pollution, and energy security.

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[2] There is still uncertainty as to how much methane leaks from the nation's natural gas supply system. Since methane is a more potent greenhouse gas than carbon dioxide, a leakage of just a few percent of total supply could reverse methane's CO_2 benefit over oil and methanol.

ETHANOL

Ethanol (grain alcohol) is currently used in gasohol. It is, however, unlikely to become a major energy source for transportation because of the large amount of agricultural land that would be needed to produce it. Despite widespread support for ethanol in corn-growing states (85 percent of ethanol motor fuel is made from corn), the fuel contributes only a tiny fraction to U.S. energy supply, equal to less than 1/2 percent of present gasoline use. To meet 1988 U.S. gasoline demand with 100 percent ethanol fuel would require planting 570 million acres in corn, an area about 75 percent greater than total U.S. cropland. The prospect of converting a significant fraction of U.S. agriculture to ethanol production makes little sense in a world characterized by a changing climate in which U.S. agriculture is expected to come out a loser, and ever tighter food supplies. For these reasons, in my view, ethanol is likely to be used in quite limited amounts as a fuel additive.

ENERGY AND TRANSPORTATION IN THE LARGER CONTEXT

The challenge of reducing urban air pollution -- which is largely the result of fuel burning, much of it in vehicles -- must be considered within the larger context of national energy and transportation policies. Energy activities, especially transportation activities, are important factors not only in our air pollution problems but also in the threats to the global climate and national security. Transportation accounts for two-thirds of U.S. oil demand which is increasingly being met by imports. Moreover, transportation accounts for about 31 percent of U.S. carbon dioxide emissions and about 40 percent of emissions of both nitrogen oxides and hydrocarbons, the precursors to smog and acid rain. *In short, transportation planning will have to play a critical role as we confront the linked issues of global warming, air pollution, and oil imports.* Up to now, federal decision making has dealt with these problems piecemeal.

ELEMENTS OF A NATIONAL ENERGY AND TRANSPORTATION STRATEGY

The United States badly needs energy and transportation policies that will simultaneously contribute to reduced air pollution, enhanced national oil security, and reduced risks of global warming. The elements of an approach that will achieve these goals are becoming clear. Some of these policies are specifically short term in nature; others involve a heavy investment in RD&D and must be pursued over a longer time frame.

o First, we need to reduce air pollution emissions from cars and trucks without jeopardizing our efforts to protect the climate. In simplest terms this means ***we must avoid a massive shift to new fossil-fuel based transportation fuels*** as a strategy to mitigate air pollution. In short, *no large scale* commitment to methanol or CNG. Limited use of these fuels in heavy duty trucks and buses in urban areas may make sense where they can be shown to have significant air quality benefits, but it makes absolutely no sense to make large investments in a new fossil fuel infrastructure when the need to reduce carbon dioxide emissions is becoming so evident.

Reducing pollution emissions can be pursued in the short term by requiring new cars to meet tighter emission standards, by lowering the volatility of gasoline to reduce evaporative emissions, by significantly strengthening inspection and maintenance (I&M) programs to get the old "super emitters" off the road, and by introducing so-called reformulated gasoline to reduce emissions from all cars on the road. Getting old, inefficient, and polluting cars off the road could pose hardship problems because these cars are often owned by poor people. But we would do well to address this problem head on and find ways of financially helping these car owners.

o Second, we must reduce carbon dioxide emissions by introducing more fuel efficient cars and trucks. Global warming and energy security can be addressed in the near term by greatly increasing the fuel efficiency of new cars and trucks. However, such improvements, while necessary, will not be sufficient to curb either CO_2 emissions or our growing dependence on imported oil if traffic continue to grow unabated. Continued growth in the number of vehicles and the resulting vehicle miles traveled has been the undoing of national efforts to improve overall national fuel efficiency and reduce oil consumption. The United States has doubled the fuel efficiency of new passenger autos since 1973. Despite this improvement, gasoline use has increased by 10 percent, largely as the result of a 33 percent growth in VMT. If there is no further improvement in new-car fuel efficiency and VMT growth continues at recent rates (2.7% per year), CO_2 emissions from cars will increase by 35 percent by 2005 over 1986 values.

o Third, we must slow the growth in vehicle miles traveled. Growth in VMT must also be addressed in any integrated national strategy to combat these three threats. It is unlikely that new-car MPG will be able to increase sufficiently fast to reduce total fuel use if VMT by light duty vehicles grows substantially over the coming years. The Department of Transportation is presently developing a national transportation policy. It is essential that this policy recognize that for several reasons controlling growth in traffic is an essential need and will require new thinking in long-term transportation and land-use planning. To successfully cope with the linked threats of oil imports, air pollution, and climate change, a rational transportation policy must encourage and support not only improved vehicle efficiency but also local planning efforts focused on increasing efficiency in the transportation system as a whole.

o Fourth, we must accelerate the introduction of new non-fossil technologies for transportation. These will be needed not only for ourselves, but as an integral part of an international approach to solving the global greenhouse warming problem. Projections indicate that worldwide growth in auto use could greatly increase global carbon dioxide emissions in the years ahead. Rather than having Detroit develop methanol vehicles of dubious value, we would be far better off encouraging automakers to develop and introduce electric vehicles and/or hydrogen powered vehicles. In the long term the energy for these vehicles would be derived from renewable technologies (wind turbines, solar cells, solar thermal power plants) or perhaps second generation nuclear sources if they can be made adequately safe and publicly acceptable.

HYDROGEN VEHICLES

Last October, the World Resources Institute released a major assessment of hydrogen as a transportation fuel for vehicles. The report, "Solar Hydrogen: Moving Beyond Fossil Fuels" was prepared for WRI by Drs. Joan Ogden and Robert Williams of Princeton University. The use of hydrogen was widely discussed during the 1970s, but interest waned when it appeared that neither nuclear power nor solar energy would be cheap enough to produce hydrogen at competitive prices. The Princeton assessment is based upon new developments in both the production and use of hydrogen as a fuel, and in the need to meet reduce air pollution and our dependency on foreign energy sources.

Emissions from Prototype Hydrogen Vehicle At the release of our report, WRI was fortunate to have at its Capitol Hill press conference a hydrogen powered automobile supplied by West Germany's Mercedes Benz. This vehicle is one of ten that have been tested by Daimler Benz during the past four years as part of a $40 million hydrogen transportation project jointly financed by the West German government and three auto manufacturers. What was remarkable was that the slightly modified four cylinder engine produced an odorless exhaust and a few puffs of steam as it was driven around Capitol Hill by members of Congress. It needed no pollution control equipment even to keep the one pollutant it does produce, NOx, well within EPA standards. As a carbonless fuel, there are no volatile hydrocarbons to contribute to smog, no carbon monoxide, toxic benzene, formaldehyde, or methanol, and as an added bonus, no carbon dioxide to contribute to the greenhouse effect. The hydrogen itself was stored more safely than gasoline in a metal hydride storage tank.

The Mercedes had a top speed of 105 miles per hour, adequate for most U.S. purposes if not for the German autobahns. Its major limitation was that its urban range is limited to about 75 miles. The major reason for this is the excessive weight of the vehicle, 4100 pounds, and the fact that no effort has been made to optimize fuel efficiency or performance.

Support for Hydrogen Strong in West Germany and Elsewhere The development of hydrogen as a transportation fuel is being actively supported by the West German government. German researchers are also exploring ways to obtain hydrogen from water using renewable energy technologies. BMW has joined with the giant Siemens corporation and the Bavarian state government to create a 600 kilowatt solar hydrogen facility near its factories in southern Germany, a region not noted for its high solar intensity. Siemens will probably utilize the new technology it has recently acquired through its purchase of ARCO Solar. Volkswagen is also participating in the joint government-industry research and development program. The Japanese also have a $20 million hydrogen transportation project, and the Soviet Union is working on hydrogen technology for both ground and air transportation. Both the Japanese and Soviets have developed hydrogen powered forklift trucks for use in enclosed spaces where exhaust fumes are a problem with traditional fuels.

Hydrogen from Non-Fossil Energy Sources Presently, hydrogen is made almost exclusively from natural gas, not a long term option if we are to protect the climate. The WRI report examines several sources for the production of hydrogen including nuclear, hydro, wind, and various solar-electric technologies. The conclusion reached by the authors is that because of encouraging technological and manufacturing breakthroughs, solar-generated hydrogen could be an attractive option by the year 2000.

Hydrogen Costs and Land Needs What are the costs of solar generated hydrogen likely to be? Depending upon various economic factors, the report estimates that, by the year 2000, solar generated hydrogen would be comparable to gasoline prices of $1.68 to $2.35 per gallon. Another question frequently raised about solar generated hydrogen is the land area that would be needed to produce enough hydrogen to be significant. To produce the hydrogen energy equivalent to all U.S. current oil use would require about 24,000 square miles in the southwest. This is one half of one percent of total U.S. land area or about 7 percent of U.S. deserts. While this sounds like a lot it is comparable to current land devoted to energy production and is only 4 percent of the land area now devoted to crop production.

NEED FOR R&D ON HYDROGEN AND ELECTRIC TRANSPORTATION TECHNOLOGIES In addition to hydrogen, the use of electricity also offers a promising route to eliminate air pollution and carbon dioxide emissions. Last week General Motors unveiled a prototype electric car with outstanding performance. The car accelerates to 60 mph in only 8 seconds and has a range of 120 miles at 55 mph. According to GM, extending the life of the batteries from 2 years to 5 would make the car competitive with conventional vehicles. (I note that the same result could be achieved with an additional gasoline tax of $1 per gallon.)

As with hydrogen, the energy for electric vehicles would eventually be derived from non-fossil energy sources, either the renewables or nuclear sources. The principal obstacle to widespread use of EVs is the lack of inexpensive, light-weight batteries with high energy density. It is a problem worthy of more research and development.

Electric and hydrogen powered vehicles are both promising candidates for the transportation systems of the future. The United States should be pursuing their development with the same vigor that will be needed to improve the fuel efficiency of our petroleum dependent vehicles for the next 10 to 20 years.

CONCLUSIONS

Programs to encourage the widespread use of methanol for ground transportation offer few air quality benefits, promise little or no enhancement of national or economic security, and would not reduce national carbon dioxide emissions. Such efforts would divert precious time and resources into paths that would ultimately prove to be dead ends because of global warming. Compressed natural gas, and perhaps methanol, may offer clean air benefits when used in heavy duty engines in urban areas, but for the reasons given, these applications should be limited in scope.

The problem of reducing urban air pollution is one of several linked national priorities, the others being increasing dependency on foreign oil and the growing threat of climate change. An integrated approach to these three problems would encompass both short and long term elements. In the short term, the national focus should be on measures to reduce air pollution and improve auto and truck fuel efficiency. Reducing pollution emissions can be accomplished through tighter emission standards, by modifications of gasoline, and by significantly strengthening inspection and maintenance (I&M) programs to get highly polluting old cars off the road. Improved fuel efficiency can be encouraged by a combination of increased fuel taxes, gas sipper/gas guzzler rebate programs, and stronger federal CAFE standards.

Over the long haul, new non-fossil energy technologies will have to be introduced to power our vehicles. Hydrogen and electricity are two leading candidates. There may be others. Federal policies should recognize the long-term need to develop and use these non-fossil sources and provide the badly needed support and direction that will be required to bring them into existence.

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3. Office of Technology Assessment, U.S. Congress, "Catching Our Breath," July 1989.

4. Office of Technology Assessment, U.S. Congress, "Catching Our Breath," July 1989, page 14, Summary.

5. Bruce Beyaert, Chevron USA, Inc., "Alternative Fuels Potential Impact on Energy and the Environment," paper presented at the National Transportation Policy Seminar on Transportation and Future Energy Requirements, U.S. Department of Transportation, August 23, 1989.

STATEMENT BY
THOMAS C. JORLING
COMMISSIONER
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
BEFORE THE
SENATE SUBCOMMITTEE ON ENVIRONMENTAL PROTECTION
JANUARY 11, 1990

MR. CHAIRMAN AND MEMBERS OF THE COMMITTEE:

I appreciate the opportunity to be here today to present New York's position on amendments to the Clean Air Act, particularly amendments that would provide a comprehensive mobile source emissions control program.

New York strongly supports the concept of requiring a clean fuels program as a component of a total mobile source program. Governor Cuomo in his State-of-the-State Message last week called for a comprehensive mobile source control program that will focus on, among other initiatives, the development of alternate fuels. I am here to ask this Committee to maintain a comprehensive mobile source program as we move forward on the discussion of clean fuels.

Like the other components of a strong mobile source program, the use of clean fuels must serve to reduce the emissions of hydrocarbons, NO_x and carbon monoxide, thus aiding our efforts to meet the health related attainment goals in our major urban areas and the additional areas that have become nonattainment such as nine new counties in New York this year. It must be integrated with drastic changes in automotive fuel efficiency, moving toward at least 42 mpg for new cars by the turn of the century. In addition, a properly implemented clean fuels program should serve to reduce the levels of toxics emitted from automobiles.

A clean fuels program, however, cannot be considered a substitute for a strong mobile source program. That program must include two phases of emission controls, strong useful life, warranty and recall provisions for 10 years or 100,000 miles, a much more aggressive certification and assembly line testing program, and strict fuel regulation. To assume that one component of this program can substitute for another will weaken the overall program and erode our goals of providing clean air, mitigating global warming, and reducing dependency on foreign oil.

While New York supports the need for a clean fuels program and applauds the Administrator for proposing a mandatory program, we have several concerns that must be addressed before we move forward with a national program.

First, there is not yet sufficient data to conclude that, over their useful life, vehicles powered by some clean fuels, especially the alcohol fuels, will actually emit less toxic and ozone-forming compounds, or whether the vehicles will perform at required levels for 10 years or 100,000 miles.

Second, the programs proposed have not adequately addressed mechanisms for assuring availability and distribution of fuels in quantities and places where the alternative fuel vehicles will be required, i.e. severe nonattainment areas.

Third, in the proposals to date, emission standards for these vehicles have not been proposed or established. There must be no equivocation: all alternative fueled vehicles must meet the standards as they are applied to conventional vehicles, and new health-protective standards must be written for any contaminants, not now regulated, that are emitted from vehicles utilizing alternative fuels.

Consequently, New York's support must be conditioned upon the assurance that the use of these vehicles is consistent with our clean air goals and implemented through a program fitting the framework - primarily the SIP process - of the Clean Air Act. Having California pilot a program using clean fuels will help address these concerns.

Therefore, Mr. Chairman, I am pleased to join with California in recommending such a clean fuels demonstration program to this Committee.

The proposal we are offering, Mr. Chairman, would accomplish several important goals. First, it would allow the State of California, which currently is prepared to move ahead with a clean fuels program, to do so, by requiring specific numbers of clean fuel vehicles be sold each year in the State beginning in 1994 and leveling off at 400,000 per year in 1996.

Second, the California experience with clean fuels would serve to provide important data to other states across the country who would then be able to use the State Implementation Plan process to determine the best application of these fuels and vehicles in their states' severe nonattainment areas.

Providing a fixed period of time to evaluate the impact of vehicles in California would allow areas such as the northeast to understand the regional impact of this program and take steps to ensure consistency in application.

Third, beginning in 1997, severe nonattainment areas as defined by the Administrator, would be required to ensure that a minimum of 30 percent of new vehicles in the area be clean fueled. This requirement would ensure that nationally at least one million clean fuel vehicles would be available for sale annually beginning in 1997.

Fourth, the program would require, beginning in 1994, that centrally fueled fleets in all severe nonattainment areas be converted to clean fuels.

And, finally, the proposal defines what emission standards a clean fueled vehicle must achieve. Specifically, they must emit 50 percent less ozone-forming emissions and 50 percent less toxic emissions than the applicable emission standards for conventional vehicles.

New York believes that a scientific and informed approach to the use of these fuels and vehicles, integrated with the SIP process, is important and will ensure the maximum air quality benefits possible.

But I must emphasize that this program cannot be considered a substitute for any part of a comprehensive mobile source program in addition to effective automotive fuel economy standards. We need all the reductions possible from all sources and pathways if we are to achieve and maintain clean air.

During the subcommittee consideration of mobile source controls, Senator Durenberger expressed his view that the states are looking for a Phase II emission control program for automobiles simply because they have failed to take action to control stationary source emissions and want to avoid taking such actions in the future. I strongly disagree with the Senator's statement. It is an error not previously associated in Senator Durenberger record on the environment. Such a statement ignores the facts of state performance. It also ignores the fact that for the eight years of the Reagan Administration, progress on clean air from the federal government has been on hold. Consequently, the automobile industry has not been challenged to build the clean, durable car we need to protect our people's health and environment.

New York is an example of a state that has continued to make progress in clean air. I believe that the actions we have taken demonstrate the commitment and resolve on the part of the states to address this issue.

As part of its State Implementation Plan (SIP), New York has:

-adopted a vehicle inspection and maintenance program and now moving to adopt an enhanced I&M program;

-required Reasonably Available Control Technology (RACT) controls on most stationary sources including some down to 10 tons per year in contrast to federal controls which are required only on sources greater than 100 tons per year;

-required Stage I and Stage II gasoline vapor controls;

-imposed controls on both architectural surface coating and auto body refinishing; and

-in February, we will propose the first set of regulations concerning consumer and commercial solvents.

And, Mr. Chairman, we have done much of this without any control guidance from EPA.

In addition to our SIP commitments, we have also imposed a summertime REID vapor pressure limit of 9.0 lbs per square inch on gasoline.

There are additional measures the state is considering. However, the potential reductions to be achieved from those measures is small compared with the total emissions generated from mobile sources in the area. Analysis shows that mobile sources contribute 90 percent of the carbon monoxide, 61 percent of the VOC's, and 53 percent of NO_x in the New York Metropolitan Area, and over 50 percent of the air toxics in metropolitan areas in general. In this context, Mr. Chairman, I am pleased to announce that two days ago, we filed with our Secretary of State, as

Governor Cuomo directed, regulations to adopt the California emission standards for automobiles.

I would like to indicate how little progress we can make from applying additional control measures on stationary sources.

We have estimated that a ban on all lawn mowers and two-stroke outboard marine engines in the New York Metropolitan Area will achieve a total annual reduction of 4,000 tons of VOC. A total ban on the use of hair spray in the New York Metropolitan Area would reduce VOC emissions by 2,900 tons annually; a ban on styling mousse would add an additional 227 tons to the reductions. A ban on all personal deodorants would account for 700 tons of VOC's annually. A ban on all-purpose cleaners would account for 2,500 tons of VOC's annually, and a ban on room deodorants and disinfectants would result in the reduction of 1,700 tons of VOC's annually. One of the largest measures we have under consideration would be a complete ban on any auto refinishing in the New York Metropolitan Area. This would account, on an annual basis, for a total of 10,000 tons of VOC's. A ban on all paints, primers, polishes, and auto waxes would account for an additional 5,790 tons of VOC's annually.

As you can see, Mr. Chairman, the measures remaining to New York and other states to control emissions from stationary sources are not effective in contrast with the reductions available from mobile sources. Mobile sources alone are responsible for 154,000 tons of VOC's while the measures above would total only 27,817 tons. Upwind sources, that is those sources outside of our control, are believed to be responsible for ozone and ozone precursors in an amount equivalent to the contribution from mobile sources in the Metropolitan area.

The contention that Phase II is merely an "out" for states from having to consider additional stationary source measures is demeaning, especially when cost effectiveness is added to the argument. It is the federal government and the automotive industry that are avoiding controls, not the states. The adoption of a strong mobile source control program, which includes both a second phase of reductions and an alternate fuels program, is necessary along with other measures if we are to meet the clean air commitments we set for ourselves in 1970.

Detroit has also expressed concern that the proposed second phase emission standards are technologically impossible. This is the very same argument the auto industry has made since 1970. When challenged on this point in 1970, a former member of this Committee, Senator Muskie, replied: "predictions of technological impossibility are not sufficient to avoid tough standards and deadlines, and thus compromise the public health. The urgency of the problem requires that the industry consider, not only the improvement of existing technology, but also alternatives to the internal combustion engine and new forms of transportation...Detroit has told the nation that Americans cannot live without the automobile. The legislation would tell Detroit that if this is the case, they must make an automobile with which the Americans can live."

When the persons who control the most powerful industries in the nation, and who are paid millions of dollars in salary annually, testify that technological achievements already on the shelf are not technically possible, even in 6-10 years, then I think we have some insight into the reasons for the American automobile industry's lack of competitiveness.

It is time once again for this body to lay down a challenge to the auto industry to produce the most durable and efficient vehicles possible. There is little doubt any more as to the contribution that mobile sources play in the total pollution picture in our urban areas. Failure to require the comprehensive mobile source program is a failure to address the fact that millions of citizens are breathing unhealthy air.

Clean fuels cannot be a substitute for continued progress and increasingly stringent, durable controls on automobiles. As Administrator Reilly has said, "Prevention is the best policy;" we must reduce pollution at every point where it is economically and technically possible. As you deliberate on these amendments, I would encourage you to institute a process that will result in the production of a vehicle that is durable, meets and exceeds all applicable emission standards for motor vehicles, has access to fuel in the areas in which they are designed to operate and is not considered by the American public to be another "Edsel." My sense is the foreign manufacturers are chopping at the bit to take on this challenge. My hope would be that such a challenge would unleash the traditional American can do spirit that was once characteristic of American industry.

In summary, the components of our program include a period of testing and evaluation of vehicles, followed by an integration in other severe and extreme nonattainment areas across the country.

I am pleased to join with California today in submitting to the committee a proposal we believe will accomplish these goals.

By following a rational process resulting in the best use of these fuels and vehicles, we will ensure the development of programs that benefit air quality, provide a stable market for Detroit, ensure the availability of fuel, and produce a durable, fuel efficient, useful vehicle.

As you move to final consideration of these provisions, you must recognize that one program cannot be substituted for another. We must regulate and reduce the emissions from all vehicles. I urge you to maintain the concept of a comprehensive mobile source program that was introduced in the original language of S. 1630 and include a clean fuels program that moves us realistically towards the use of these fuels.

The Committee has indicated its interest in the position of the NESCAUM states regarding clean fuel. They have been asked to testify and will supply testimony within the week.

While not all NESCAUM states have had an opportunity to endorse this proposal, they support the following concepts as part of a clean fuels program:

1. Clean fuels as part of a total mobile source program that includes a second phase of automobile emission standards

2. Testing and demonstration of these vehicles and fuels.

3. Analysis of the impacts of these fuels on air quality and energy considerations in both local and regional air sheds

4. Flexibility to design a program of clean fuel use through the SIP process

5. A review of the potential infrastructure costs and the need to mandate specific fuel use

6. Conversions of fleets to clean fuels.

I believe these concepts are embodied in the proposal New York and California make to you today.

Mr. Chairman, there is one additional mattor that I must bring to the attention of the Committee. As you may know, the State of New York has petitioned EPA under Section 126 of the Clean Air Act to take actions to control the emissions of ozone precursors upwind of the New York/New Jersey metropolitan air quality region area. We've taken this action because of our concern over the health of our citizens. Simply put, there is no way we can achieve healthful air without controls on emission sources upwind of us. Your provision in the S. 1630 Section 186, addresses this problem and we strongly support it, especially its inclusion of mandatory minimum controls in the upwind areas.

We believe, however, that EPA has the current authority under Section 126 to address this problem. However, in response to our petition asking EPA to impose such controls, EPA has said, and I quote, "New York should supplement the petition with information identifying the culpable sources and their contribution to New York's nonattainment problem." Mr. Chairman, that turns federalism on its head. EPA does not dispute that something on the order of 40 percent of the ozone entering the Northern New Jersey/New York Metropolitan Area comes from upwind sources. It is clear that stationary and mobile sources upwind of our area contribute a dominant amount of the ozone to New York's air; but EPA says that they cannot act unless the State of New York identifies the specific sources upwind of our jurisdiction that are causing and contributing to the violation of our ambient air quality standards. If New York must identify the sources in other states, then what does the federal government exist for, Mr. Chairman?

New York has no jurisdictional reach into the states of Maryland, West Virginia, Virginia, Ohio, and Pennsylvania -- the federal government does. Under the Clean Air Act, the federal government is the entity by which interstate air pollution is dealt with, and yet EPA's position seeks to lay that burden on the State of New York. That is an abdication of authority and responsibility which contravenes clear Congressional intent, Mr. Chairman. Your amendments must address the EPA's flawed view of the federalism inherent in its administration of the Clean Air Act. I would be happy to provide copies of our petition and the exchanges we have had with EPA regarding their action upon this petition for the record, Mr. Chairman.

DS:sl
1/10/90

TESTIMONY OF TOM CACKETTE
DEPUTY EXECUTIVE OFFICER
CALIFORNIA AIR RESOURCES BOARD

to

SUBCOMMITTEE ON ENVIRONMENTAL PROTECTION
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS
UNITED STATES SENATE

January 11, 1990

Thank you for the opportunity to testify today. As you know, California has serious air pollution problems in most of its major cities. In fact, more people are exposed more often to higher levels of ozone in California than in the rest of the states combined. Thus for the Clean Air Act to address the public health problems caused by ozone, it must address the air pollution problem in California.

To effectively address the worst ozone air pollution problems in California and our country, we believe the Clean Air Act must include the following provisions:

1. Strong, but fair, non-attainment provisions (Title 1) which assure rapid progress towards attainment of clean air standards.
2. Strong, technology forcing emission requirements for all categories of motor vehicles.
3. A program that requires the use of cleaner motor vehicle fuels in the severe non-attainment areas that will complement improved emission control equipment.

S.1630 contains strong emission standards (the so-called second tier standards which go into effect in 2003) which we believe can be met in that time frame at a low cost. California strongly supports these standards and urges their retention in the bill.

We also believe the severe and extreme ozone non-attainment areas of the country will need additional emission reductions that can be most effectively realized through the use of cleaner fuels. To this end, the air quality and energy experts in California have worked over the past month to develop a clean alternative fuels proposal for your consideration. We have involved representatives of the northeast states in the development of this proposal, which is attached to my testimony. The development of our proposal benefited from the early draft alternative fuels proposal of Senators Chafee and Durenberger.

Our proposal would have California move ahead with a clean fuels program in Los Angeles, beginning with a 150,000 vehicles in 1994. California's experience with this program would provide valuable information to help the other severe ozone non-attainment areas determine how best to introduce clean fuel vehicles, which would begin in these areas in 1997. Clean fuel vehicles would be defined as those vehicles whose emissions are twice as clean (i.e. form less than half the ozone and are at least 50 percent less toxic) as vehicles which meet the conventional emission standards of that model year.

States with severe ozone non-attainment areas would determine the exact number of vehicles needed to address their air quality needs. EPA would require vehicle manufacturers to produce this number of clean fuel vehicles, and fuel suppliers would be required to sell the clean fuels which these vehicles are designed to use. Marketable credits would provide flexibility in meeting these requirements.

I wish to elaborate on the "twice as clean" criterion we have used to define a clean fuel vehicle. In our proposal the clean fuel vehicles sold in severe non-attainment areas are twice as clean as vehicles sold elsewhere. This is true even after the second tier standards of S.1630 go into effect. Thus our recommended clean fuels program complements the new vehicle emission standards of S.1630 and provides additional emission reductions needed by areas with especially difficult and long term pollution problems. It is this important provision which most differentiates our proposal from the January 5 alternative fuels proposal of Senator Chafee. [Manufacturers can meet the twice as clean standard by using cleaner fuels in vehicles which meet the applicable emission standard, or by using advanced emission controls with conventional fuels.]

You may be aware that last month the California Air Resources Board (ARB) took the first step towards adopting a regulation which would require introduction of low emitting and ultra-low emitting vehicles in Los Angeles, beginning in 1994. You may find it interesting that our proposed regulation, which will likely result in the use of clean fuels, received considerable support from both public and private sectors, including some of California's oil companies. One reason for the support is all sectors affected by clean fuels participated in a year long study of clean fuels, which was completed this summer.

The Advisory Board which conducted this study compiled an extensive record on the subject of clean fuels, which included California's experience with 25 million miles of clean fuel vehicle operation. Based on this record and after a public hearing, the Advisory Board concluded that clean fuels would provide significant air quality benefits and would be needed to attain air quality standards in California. They also found that the use of clean fuels is a cost effective means of reducing air pollution. As a result, this broad-based advisory board recommended that ARB adopt regulations requiring the production and sale of low emitting vehicles, many of which may utilize clean fuels. We urge you to look at the findings of the advisory board as additional support for including a clean fuels program in S.1630.

In closing, I would like to return to my first point; the need for strong and fair non-attainment provisions (Title 1) of the Act. We have submitted to the Committee staff several amendments which would provide essential flexibility in how we attain the ozone air quality standard. These amendments deal with new source review, attainment dates, and EPA approval of technology forcing standards. Without these amendments, California could not fully comply with the Act, and would suffer sanctions under the revised Act even though we have continued to implement controls which go far beyond its requirements. I request your support of these amendments so that we can fully support S.1630.

Thank you again for this opportunity to speak with you.

Attachment: Clean Alternative Fuels Program for S.1630: Recommendations of the States of California and New York (1/8/90)

CLEAN ALTERNATIVE FUELS PROGRAM FOR S.1630

Recommendations of the States of California and New York
(1/8/90)

Summary: Beginning with model year 1994, low emission, clean fueled vehicles would be introduced in substantial numbers in California, which has the nation's only "extreme" non-attainment area for ozone, greater Los Angeles. The air quality plan for Los Angeles has demonstrated that use of clean fuel vehicles is necessary if attainment is to be achieved within 20 years, as required by S.1630. This early introduction in California would provide a real life demonstration of the public acceptance and on-road emission performance of clean fuel vehicles.

Introduction of clean fueled vehicles in the severe and larger serious non-attainment areas would begin three years later. Smaller serious areas could opt-in if the need is demonstrated. These determinations, made through the SIP process, would also identify how many clean fueled vehicles would be needed in each area. Based on this determination, vehicle manufacturers and fuel suppliers would know in advance the demand for clean vehicles and fuels.

The term "clean fueled vehicle" would be defined as any vehicle whose total reactive organic emissions form at least 50 percent less ozone, and are 50 percent less toxic, than the emissions of similar vehicles meeting the conventional vehicle standards applicable in that model year. This emission reductin requirement would be increased by the EPA as low emission technology advances. The vehicle's emission performance would determine which of the many combinations of emission control technology and cleaner fuels would qualify a vehicle as clean fueled.

Program details can be found on the next page.

Scope: Introduction of clean fueled vehicles in greater Los Angeles would begin in model year 1994, and expands in 1997 to those severe non-attainment areas and serious non-attainment areas with over 300,000 population which demonstrate the need for clean fuel vehicles through the State Implementation Planning (SIP) process. This program would complement the two tier emission standards in S.1630.

Production of Clean Fueled Vehicles: EPA shall require vehicle manufacturers to produce and offer for sale the following number of light and medium duty clean fueled vehicles:

1994	150,000
1995	300,000
1996	400,000
1997+	as determined by SIPs for extreme, severe and larger serious ozone nonattainment areas

In 1994-96, the number of clean fueled vehicles referenced above shall be offered for sale in California. To determine how many vehicles would need to be produced in 1997 and subsequent years, states with severe ozone non-attainment areas would be required to determine through the SIP process how many clean fueled vehicles are needed to attain air quality standards within the time period (10 or 15 years) provided in the Act, subject to a minimum of 30 percent of new vehicle sales. Areas may opt-out if it is verified that the use of clean-fueled vehicles would not contribute to improved air quality. Areas with less severe air pollution could opt-in based on a showing that clean fueled vehicles are needed to reach attainment. Based on these evaluations, EPA would notify vehicle manufacturers of how many clean fuel vehicles would need to be produced for each state. EPA would be required to provide the necessary methodology and criteria by 1992 on which the SIP evaluations would be made. The EPA methodology shall address the regional and local impacts of clean fuel use, including the need for areas upwind of nonattainment to use clean fueled vehicles, and shall be compatible with modeling and other techniques used in the SIP process.

Fleets: Each severe and extreme area shall, beginning in 1994, require operators of fleets of 10 or greater vehicles to purchase clean fuel vehicles, subject during 1994 to 1996 to the availability of appropriate models. States may require fleets capable of being centrally fueled to purchase dedicated fuel vehicles. Vehicle manufacturers providing clean fuel vehicles for sale in California in 1994 would be required to make clean fuel vehicles available in the rest of the nation in numbers sufficient to sustain the fleet programs in affected areas. Each vehicle manufacturer who has sold greater than 100,000 vehicles in the U.S. in any single year would be required to certify and make available for sale at least one dedicated clean fuel vehicle by 1994. Each heavy duty engine manufacturer would be required to certify and make available for sale one engine model beginning in 1997 if the need for such engines are demonstrated in the SIP process.

Emission Standards: Clean fueled vehicles must be certified to have reactive organic emissions which form at least 50% less ozone and are 50% less toxic than the emissions of similar vehicles meeting the conventional vehicle standards applicable in that model year. This percentage emission reduction requirement could be increased as more effective emission controls and improved fuels are developed. Clean fueled vehicles must meet all other applicable emission standards. Vehicles which emit aldehydes would have to meet emission standards for this pollutant which are at least as stringent as those that have been adopted by California. A provision could be included to assure that vehicle fuel cycle causes of greenhouse gases would not exceed those for the conventional gasoline fuel cycle. Urban transit districts would be required to convert existing buses, at the time of major overhaul, to meet the 1991 emission standards.

Fuel Supply: Fuel suppliers would be required to make available and sell sufficient clean fuels at larger service stations and on major transportation corridors to meet the fueling needs of the clean fuel vehicles in operation.

Level Playing Field: Vehicle emissions, not fuel type, would determine whether a vehicle qualifies as a clean fuel vehicle. For example, a vehicle manufacturer may choose to use very advanced emission controls with conventional gasoline, conventional emission controls with very clean fuel, or a combination of moderately improved controls and fuel. Whichever approach is chosen by the manufacturer, the resulting reactive organic emissions would have to form at least 50 percent less ozone and be 50 percent less toxic than the emissions of a vehicle which otherwise meets conventional emission standards for that model year. The process of choosing which approach or approaches complies with the more stringent clean fuel vehicle emission standards will determine the fuels that will need to be made available by the fuel suppliers. This will be known several years in advance of the sale of vehicles, thus providing the fuel suppliers with leadtime to make the necessary fuels available.

Marketable Credits: Beginning in 1997 marketable credits could be generated by producing more vehicles or selling more fuels than required. This could benefit smaller companies who may find it more economical to buy credits than invest in the distribution and sale of a new fuel.

Marketable credits could also be generated by converting new or used gasoline vehicles to meet clean fueled vehicle standards. For example, electric motors and batteries could be installed in van chassis. Existing gasoline vehicles could be converted to operate on natural gas. EPA would be required to adopt procedures governing the conversion of vehicles to assure that emission control performance is not compromised. The resulting credits could be sold to vehicle manufacturers to reduce their requirements to produce clean fueled vehicles.

The marketable credits system will help producers of non-liquid fuels (e.g. natural gas and electricity) compete in the traditional liquid fuel marketplace.

Testimony of Donald R. Buist
Director, Automotive Emissions and Fuel Economy Office
Ford Motor Company
Before the Senate Environment and Public Works Committee
Environmental Protection Subcommittee
January 11, 1990

Mr. Chairman, thank you for the opportunity to present our views on automotive legislative proposals before this committee and to relate our experience with alternative-fuels vehicles.

The draft alternative-fuels proposal circulated by the Committee in its letter of invitation would require manufacturers to produce a specified number of "clean fuel" vehicles that would be sold in the nine worst ozone nonattainment areas. A second phase -- the "ultra-clean fuel" vehicles -- would be mandated beginning in 1997 for centrally fueled and maintained fleets in all extreme or severe nonattainment areas.

Ford has a number of serious concerns with the draft proposal:

Production Mandates. From a practical standpoint, production mandates are not really much different than sales mandates, because the costs of production ultimately will have to be recovered through vehicle sales. Automakers consistently have opposed sales mandates for alternative-fuels vehicles. Consumers are understandably wary of new technology and no one can predict how many of these vehicles will be sold. It would be most unfair to require manufacturers to assure a specific sales or production volume because manufacturers cannot force consumers to purchase their products. If Congress decides that alternative-fuels vehicles should be part of the clean air bill, local government should be required provide vehicle and fuel incentives to stimulate consumer demand and manufacturers should be held responsible for being ready to satisfy this demand.

"Ultra-Clean" Vehicle Requirement. Emissions of volatile organic compounds (VOCs) from ultra-clean vehicles would be required to be 80 percent lower than proposed first-tier emissions standards in S.1630, effective in 1993. Meeting these standards is a significant technical task that will require a huge commitment of industry resources. In addition, toxic emissions from ultra-clean vehicles would have to be reduced by 90 percent. There is no known vehicle or fuel technology capable of achieving the proposed performance standards for ultra-clean vehicles. Some alternative-fuels vehicle technologies have the potential to meet the VOC performance standard for ultra-clean vehicles, but they may not be able to simultaneously achieve other tailpipe emissions standards (e.g., CO and NO_x) and proposed reductions for toxins.

Second Tier Tailpipe Standards. Manufacturers have testified -- and government experts agree -- that there is no present or anticipated technology that can achieve the second-tier levels. However, alternative-fuels vehicles are a promising and efficient approach to achieve future air quality gains in the worst nonattainment areas without imposing the costs of tighter tailpipe standards nationwide. If Congress decides to include an alternative-fuels vehicle program in the clean air bill, it should be in lieu of a second tier of tailpipe emissions standards.

Despite concerns with the proposed approach, we continue to believe that a workable alternative-fuels program is the most promising approach to further reduce auto emissions in the worst ozone nonattainment areas. We also believe there are several concepts key to facilitating a successful transition to alternative-fuels vehicles.

- We shouldn't try to make up our mind today on which fuel is the fuel of choice for tomorrow's vehicles. Rather, the legislation should specify criteria and let all potential clean fuels compete on an equitable basis.
- There needs to be a centralized public fact-finding by EPA that assures that we have the most complete answers possible to questions of air quality improvement, impacts on health and global warming, and fuel availability. This information should serve as the basis for identifying eligible clean fuels, so that the energy and auto industries will have

clear notice as to what will be expected of them. While the January 5 draft proposal does provide for a fact-finding study, the proposal also requires that manufacturers make commitments to produce alternative-fuels vehicles before the results of the study even are available.

- Consumers are likely to need incentives to purchase alternative fuels and alternative-fuels vehicles. Ford market research has shown that consumers recognize the potential air quality benefits of these fuels and vehicles, but consumers also are concerned about new technology, durability, reduced driving range and uncertain fuel availability and cost. Incentives provided by local government are essential to ensure that the requisite numbers of vehicles will actually be purchased and operated on alternative fuels.
- Manufacturers should have the capability in place to produce alternative-fuels vehicles in volumes to support customer demand in nonattainment areas. Manufacturers cannot be held responsible for guaranteeing specific production or sales volumes.
- Widespread availability of alternative fuels is critical to developing consumer demand and achieving the desired air quality benefits.
- Flexible-fuel vehicles are the quickest way to get alternative-fuel vehicles on the road while the fuel infrastructure is being put in place. Flexible-fuel vehicles are capable of operating on alcohol-based fuels, gasoline or any combination of these fuels with a single fuel tank and no action on the part of the driver.

Of the proposals under consideration, the amendment by Representatives Hall and Fields, adopted by a House subcommittee, comes closest to meeting these criteria. The amendment would require manufacturers to certify to EPA that they have the capacity to produce, distribute and offer for sale the required volumes -- 500,000 in 1995, increasing to one million in 1997. A production-capacity requirement will require manufacturers to: 1) develop and engineer alternative-fuels vehicles, 2) put in place manufacturing facilities, 3) make commitments to suppliers to assure availability of components, and 4) establish marketing and sales programs -- all to ensure that customer orders can be met at the volumes provided.

The committee also asked for comments on our experience with alternative-fuels vehicles. Ford has invested heavily and pursued extensive research on methanol, ethanol, compressed natural gas (CNG), and liquefied petroleum gas (LPG). We also have done considerable work on electric vehicles in our joint program with General Electric, several battery manufacturers and the U.S. Department of Energy.

We are presently evaluating the results of a recently completed five-year study of CNG vehicles. Additionally, Ford and other domestic manufacturers recently joined with 14 oil companies in a comprehensive research and testing program to evaluate reformulated gasoline.

Most of our development efforts have focused on methanol-powered vehicles. We have some 600 methanol vehicles and about 30 flexible-fuel vehicles now in service. An additional 210 flexible-fuel vehicles were delivered late in 1989 and we are hoping to put more than 2,500 of these vehicles in service over the next several years.

Flexible-fuel vehicle fleets will help us to resolve open technical issues, such as the corrosive effect certain alternative fuels have on some components, the difficulty of starting these vehicles in cold weather and high mileage, in-use vehicle emissions performance. Thus far, these issues have proven to be difficult challenges for manufacturers.

There also is a need to address expected consumer concerns about alternative-fuels technology. Recent market research conducted by Ford indicates that consumers are interested in alternative-fuels vehicles but are -- as I previously mentioned -- concerned over vehicle cost, driving range, reliability, durability, resale value and the cost and availability of alternative fuels.

These difficult technical and marketing questions must be answered if the nation is to implement a successful alternative-fuels program. The importance of resolving such questions is illustrated by the nation's earlier experience with the use of diesel engines in passenger cars. Because this promising technology was rushed to market to meet government demands for accelerated CAFE increases, consumers did encounter some problems with a few products. These problems seriously damaged the reputation of the technology with American motorists and diesel vehicle sales fell far short of expectations.

In summary, Ford believes that alternative fuels can help to meet the nation's environmental and energy challenges. A workable alternative-fuels vehicle program is a more promising and efficient way to improve the air quality in severe nonattainment areas than an additional round of tailpipe standards. For our part, Ford is taking the actions that will assure that the vehicle technology is ready to permit alternative fuels to play a role in helping more areas attain national air quality goals.

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TESTIMONY OF HAROLD IDELL
SENIOR MANAGER OF VEHICLE ENGINEERING AND PLANNING
FEDERAL EXPRESS CORPORATION

BEFORE THE SENATE ENVIRONMENT AND PUBLIC WORKS COMMITTEE ON LIGHT DUTY FLEET AMENDMENTS

JANUARY 11, 1990

Mr. Chairman: My name is Harold Idell and I am the Senior Manager of Vehicle Engineering and Planning for the Federal Express Corporation. I am responsible for the technical, procurement, maintenance and compliance policies of the nation's largest light duty van fleet which will be affected by pending amendments to the Clean Air Act. On behalf of the 85,000 employees of Federal Express, I thank you for this opportunity to appear before you. We know that our observations and concerns are representative of those of the other fleet administrators of large fleets and the National Association of Fleet Administrators (NAFA) who represent roughly three times as many passenger cars than light vans and trucks.

Federal Express has been a pioneer in alternative fuels. We have over 500 vehicles in Canada operating on propane of which over 200 have been in operation for over 5 years. Federal Express is participating in both the light duty and heavy duty vehicle alternative fuels programs with the California Energy Commission (C.E.C.) and the South Coast Air Quality Management District (S.C.A.Q.M.D.) both of which are running extensive tests on the state of alternative fuels technology. We have been and will continue to participate in state and local alternative fuel programs.

Further, we have been working with our vehicle suppliers and component manufacturers to develop a gaseous fuel system for computer controlled electronic fuel injected gasoline engines. As a matter of corporate policy, Federal Express is committed to the investigation of the potential environmental and economic value of alternative fuels.

We have reviewed Senator Chafee's proposal and like it because it is a broad based alternative fuels proposal which includes the manufacturers, fuel suppliers and fleets. It appears to be a fuel neutral proposal which allows time for demonstration programs and technological development. Any fleet proposal should tie into the broader alternative fuels amendment if it is to have an impact on the environment because all fleets together represent less than 5% of the nation's vehicles. The Chafee proposal addresses only centrally fueled and centrally maintained fleet vehicles which we support. However, we would like the following changes to the Chafee proposal:

1) Exemption from local traffic control measure (TCMs), zoning codes for tunnels, buildings, parking garages, etc. which preclude the use of alternative fueled vehicles.

2) Special lanes established for car pools, buses and special duty vehicles should be open to alternative fueled vehicles.

3) New alternative fuel vehicles should come through the manufacturer to avoid the issue of who is responsible for the long term warranty on the emissions and fuel systems, vehicle performance, reliability, durability, availability of repair parts, mechanic training, etc. as well as assuring the availability of the vehicles. This would encourage the development of a resale market which does not exist.

4) The same availability requirements that apply to "clean fuels" should be expanded to "ultra clean fuels." There must be the availability of more than one "ultra clean fuel" in an area.

5) Review of existing regulations governing financial responsibility for fuel storage tanks with the goal of eventually reducing premiums.

Federal Express has encountered some negative experiences with after-market conversions during its development work with methanol and compressed natural gas. Legislation that mandates after-market conversion technology must be avoided. It should be the option of the fleet to make such conversions count as part of its emissions quota but not mandated. Only each fleet can determine if it is economically able to assume the risk of using unregulated after-market vehicle conversions that remain unproven over the long run. To protect the fleet and other uses, we suggest a requirement that conversion companies provide a prepaid insurance policy for the time frame defined by the EPA to cover the warranty of the emissions systems, fuel systems and other components that fail due to the conversion to alternative fuels. Waivers would be allowed only if the automobile manufacturers provided in writing that they assume the responsibility for the warranty.

In summary, due to the high risk associated with developing alternative fueled vehicles, we believe that as a matter of national environmental policy, a system of incentives will have better environmental results than mandating technology that remains unproven on a long-term basis. It is essential that Congress establish a level playing field for all the potential alternative fuels. Any legislation that mandates fuel usage that does not tie into the nation's total strategy for clean vehicles, clean air and global warming would be a mistake. We simply request that you use good judgment, based on the technical facts available to you, to encourage fleets and manufacturers through incentives to develop clean emission vehicles that tie into nation's energy, clean air and global warming policies.

ATTACHMENT TO
TESTIMONY OF HAROLD IDELL
FEDERAL EXPRESS CORPORATION

RESPONSE TO QUESTIONS
FROM
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS

(REFERENCE: Letter dated January 5, 1990
from Senators Chafee and Baucus)

1. To what extent can alternative fuels contribute to improved air quality? Using existing pollution control technology, what impact would the various alternative fuels have on hydrocarbon and nitrogen oxide emissions from vehicles (on a per vehicle basis) in use? To what extent would those reductions (including any change in the reactivity of the hydrocarbons) improve air quality in nonattainment areas?

2. To what extent would emissions of air toxics from vehicles and from fuel handling be reduced by the use of various alternative fuels?

3. Would emissions of other air pollutants be increased or more difficult to control from vehicles using alternative fuels?

4. What are the global warming implications of various alternative fuels when the entire fuel cycle is considered?

5. Are there other health, safety or environmental implications, either positive or negative, associated with the various alternative fuels?

6. How reliable is the data that is currently available with respect to each of the alternative fuels and questions 1-5? If additional data is necessary before an alternative fuels program is implemented, how should that data be acquired?

7. What is the most likely application for each of the alternative fuels (i.e., passenger cars, delivery vehicles, fleet vehicles, transit buses)? In which nonattainment areas should alternative fuels be used? What are the economic parameters of the most likely applications (including vehicle costs, fuel costs, and distribution infrastructure costs)? What factors other than costs will influence consumer acceptance of the vehicles or the fuels?

8. If alternative fuels can make a substantial contribution to improved air quality, how do we assure that the vehicles and fuels are produced and sold? What role should the Federal Government play? the States with serious air quality problems? the auto and oil companies? fleet owners? others? What impact does an alternative fuels program have on other sectors of the automobile and fuels industry (i.e., car dealers or service station dealers)?

9. Are there modifications to existing gasoline or diesel fuels beyond the reduction in RVP required by S. 1630 which would contribute to hydrocarbon or oxides of nitrogen emissions

reductions from vehicles in the existing fleet? Are there gasoline or diesel fuel modifications which would lead to significant reductions in the emission of air toxics or other pollutants including carbon dioxide from the existing fleet? What are the costs of such modifications? How might the modifications be implemented in the most cost effective way (where should the modifications be required; which existing vehicles should be using a modified fuel)?

10. What role might reformulated gasoline play in achieving significant hydrocarbon, oxides of nitrogen or toxic emissions reductions from new vehicles (vehicles engineered to take full advantage of the reformulated gasoline potential)?

Response to Question 1:

If only fleets are required to operate alternative fuel vehicles, Federal Express, the National Association of Fleet Administrators (NAFA) and others associated with fleet operations seriously question whether any overall measurable reduction in emissions will be achieved. This is based on the fact that of every fleet-registered car, van and light truck were converted to alternative fueled vehicles, less than 4.3 percent of all vehicles would be affected. By limiting the alternative fuel requirements further to certain non-attainment areas and to centrally fueled and centrally maintained fleets only, significantly less or no positive impact on air quality will be achieved. In addition, most fleet vehicles are three years old or less and they are the best maintained vehicles. From our perspective, every effort should be made to encourage the general public to buy alternative fueled vehicles.

Response to Questions 2, 3, 4, 5:

Defer to the suppliers and other agencies.

Response to Question 6:

Reference the 1988 Alternative Fuels Act.

Response to Question 7:

Federal Express will use alternative fuels in its light duty pick up and delivery vans in the worst non-attainment areas first. Because of range versus payload and fuel availability, we will have to restrict their use to routes of 50 miles per day or less. If the total payback is more than three years on each type of vehicle, the conversion is cost prohibitive. Many fleets will divest if the cost becomes prohibitive under these parameters.

Response to Question 8:

If fleets are mandated to operate alternative fueled vehicles, there should be corresponding requirements for the vehicle manufacturers to produce the vehicles and the fuel companies to provide reasonable availability of the fuel. The general public must be encouraged to use the vehicles so that fleets have a resale market for their used alternative fueled vehicle. The EPA should be the coordinator of the state activities so that well meaning but technically and operationally unfeasible demands by the states are not placed on the potential uses.

Response to Question 9:

We defer to the supplier and the other agencies on the technical issues. However, fleets are the cleanest vehicles operating today due to their age and better maintenance than the public's vehicles. As noted by the EPA's data, a significant and immediate impact on air quality can be made if clean fuel for the older general public's cars can be introduced. If stage II recovery systems are implemented along with the "new" fuels, a bigger impact can be achieved.

Response to Questions 10 and 11:

Defer to the suppliers and other agencies.

Statement of
General Motors Corporation

Submitted to the U.S. Senate
Subcommittee on Environmental Protection of the
Committee on Environment and Public Works

Hearing on Alternative Fuels

Presented By

James B. Fitzpatrick, Vice President

January 11, 1990

Washington, D.C.

Good Morning. My name is James Fitzpatrick. I am Vice President for Marketing and Product Planning of the General Motors Corporation. I am pleased to have this opportunity to discuss General Motors' efforts to develop alternative fuels technologies. I would also like to share our views on some of the issues associated with a sensible and successful implementation of any alternative fuels program for our nation. In particular, I would like to stress our opposition to imposing sales mandates on vehicle manufacturers as a means of speeding a transition to the wider use of alternative fuels.

General Motors recognizes the potential of alternative fuels to promote energy security and environmental objectives. We also recognize, however, that successful introduction of any alternative fuel for transportation use will require not only the introduction of new technology, but also the resolution of basic uncertainties, including considerations of safety, costs, and consumer acceptance. Each of the major fuel alternatives to current gasoline has unique characteristics with respect to these and other factors, including also environmental and health-related impacts. Because of these uncertainties, GM is exploring a wide variety of alternative fuel technologies, targeted to different types of applications and customer requirements. Today, I will focus on our efforts in three areas — reformulated gasoline, alcohol fuels, and electric vehicles.

General Motors' interest in reformulated gasoline is based on a growing awareness that an effective transition is a key component of any alternative fuels program. Reformulated gasoline is of special interest as an alternative to current gasolines because it could be used in existing vehicles and could be distributed through the existing fuel infrastructure. Thus it could provide great leverage in improving air quality, without demanding any immediate changes in the behavior or expectations of consumers. Also, by contrast to other alternative fuels, reformulated gasoline could start to provide air quality benefits almost immediately, since its widespread use would not have to await the gradual replacement of the existing vehicle fleet.

On October 17, GM, together with Ford, Chrysler and 14 major oil companies, announced a comprehensive joint research and testing program to evaluate fuels for use in current and future model cars and light-duty trucks. The program is consistent with President Bush's Clean Air Act Proposal, which for the first time considers cars and trucks and the fuels they use as a total system. In the initial phase, now underway, we are seeking to determine the emissions, air quality effects and cost effectiveness of various methanol fuels used in prototype vehicles, and of reformulated gasolines used in current as well as in past model vehicles. During this phase of the program, all types of vehicle emissions - exhaust, evaporative and running losses - will be measured to determine the potential reductions in urban ozone from use of any of the tested fuels.

Much of our fuels activity at General Motors has focused on the alcohols -- methanol and ethanol -- which we have approached in several ways. Currently, all of GM's gasoline-burning vehicles are designed to use alcohols as oxygenated components in gasoline. Oxygenates in gasoline make an engine's air-to-fuel ratio leaner This can result in less carbon monoxide and hydrocarbon emissions. Our current owners' manuals now recommend the use of properly-blended gasolines containing oxygenated components.

We are also looking at the other end of the spectrum -- high-alcohol-content fuels. Here we are concentrating on M-85 (85 percent methanol, 15 percent gasoline) in variable-fueled vehicles designed to operate on any combination of fuels from pure gasoline to these high-alcohol-concentration blends. We believe the variable-fueled vehicle represents a necessary step in any transition to alcohol fuels because of the current absence of an alcohol-fueling infrastructure. Until such an infrastructure was fully operational, consumers would be hesitant to invest in vehicles that depend on nontraditional fuels with limited availability.

We now have several pilot programs underway to help us understand the issues associated with introducing methanol-fueled vehicles on a commercial basis. We are especially pleased to be participating in the California Energy Commission's Methanol Fuel Flexible Vehicle Demonstration Program. Between now and 1992, General Motors will supply the program with 2,220 vehicles, as well as special service training and support. These vehicles will be equipped with GM's newly developed variable fuel control system, which allows operation with M85 gasoline, or any mixtures of gasoline and alcohol (including ethanol), depending on the fuel chosen by the operator.

General Motors is also the leader in electric vehicle research and development. Electric vehicles offer the potential for dramatic reductions in vehicle emissions. Realizing the full air-quality benefits of these reductions will, however, require actions to be taken outside the control of the motor vehicle industry. Meeting the electric power needs of a sizable fleet of electric vehicles will clearly require adding electric-power generating capacity. Such power will have to be produced from efficient and clean sources of primary energy if we are to realize the full potential of the electric car.

Nonetheless, we feel that if the problems of clean power generation are solved, electric cars may one day have a role to play in meeting urban transportation needs. Last week, we unveiled the Impact -- a prototype two-passenger electric vehicle that sets new standards for electric vehicle performance. With a range of 120 miles between charges and with better acceleration than many sports cars, the Impact holds the potential to meet most urban drivers' daily needs. The Impact achieves its remarkable performance thanks to new developments in electronics, motor design, structural materials, tires and batteries, coupled with careful attention to weight and aerodynamic and rolling design efficiencies. GM is applying for nearly a dozen patents on various innovations in the car. While there are no current plans to produce the Impact, we are evaluating a business plan to explore its possible future production.

While General Motors is proud of the progress we have made to date in exploring a wide variety of alternative fuel technologies, many questions remain to be answered before we can begin an orderly transition to the wider use of alternative fuels. For many fuels, numerous uncertainties about safety, materials, durability, range, refueling and operating conditions are still to be resolved satisfactorily. Much is yet to be discovered about issues such as anticipated air quality benefits, health effects, and the impacts of new fuel technologies on possible global climate change. We are trying to fill in the knowledge gaps in these areas as rapidly as possible, but these significant uncertainties remain. These uncertainties argue strongly that we should not be forced prematurely to take a much more narrow focus in our continuing alternative fuels work.

The most significant uncertainty from a marketing standpoint is the acceptability of alternative-fueled vehicles to the consumer.

Clearly, we are vitally interested in knowing what the consumer wants, and we devote much time, effort and resources to finding out. But, the likelihood of collecting added-value information from consumer research is greatest when we can be confident that the attitudes and intentions identified by consumers will predict their actual behavior. At GM, we can readily identify a consumer's attitudes, preferences and behavior when that consumer fully comprehends the essential features of an issue about which he or she is asked to respond. But any consumer would be hard pressed to comprehend as unfamiliar and complex an issue as alternative fuels. While there is definitely room for education of the consumer, no one is able to predict, with confidence at this time, how consumers will ultimately react to alternative-fueled vehicles.

What we do know now is that methanol-fueled vehicles have certain conspicuous operating characteristics that would ordinarily influence most consumers' willingness to purchase them. For example, consumers would have to be willing to accept either much larger fuel tanks or greatly reduced operating ranges than they are accustomed to in today's vehicles. Advocates of mandating alternative-fueled vehicles often gloss over these concerns, but satisfying the wants and needs of consumers, who have a very wide range of choices in this highly competitive marketplace, is a much riskier and potentially more costly proposition for manufacturers.

It is clear that gaining consumer acceptance of vehicles using new fuels will be crucial in assuring a smooth transition to wider alternative fuel use. Yet, as I have indicated, today we know very little about how U.S. consumers will respond to alternative fuels and the vehicles that use them. For this reason, we oppose any program that mandates the sale or production of alternative-fueled vehicles in set volumes or as set percentages of the new vehicle fleet.

We believe that any effective legislative or regulatory strategy for paving the transition to the wider use of alternative fuels must include market-based incentives rather than "command and control" approaches like sales mandates. Only by providing consumers with the requisite financial incentives to purchase alternative-fueled vehicles and to use the fuels themselves can any goal of wider alternative-fuel use be met. If such a goal were to be pursued, a more rational and far more effective approach than mandates would be to require that state implementation plans (SIPs) for areas participating in the alternative-fuels program include incentives adequate to support the desired fuel and vehicle volume goals. On the vehicle side, such incentives could include state income tax credits, sales tax forgiveness, or lower registration and licensing fees.

Our concern over sales mandates is based upon the recognition that in today's increasingly competitive vehicle market, any attempt to force consumers to accept new technologies that they would not otherwise want is doomed to almost certain failure. Variable-fueled vehicles will almost certainly be more costly to the consumer than comparable gasoline vehicles, and methanol fuel is likely to be more expensive on an energy-equivalent basis than gasoline, especially during the initial transition period. Given these higher costs and inconveniences, such as reduced operating range, why should consumers volunteer to purchase VFVs or methanol fuel, when less expensive conventional vehicles and fuels are still available to them? While wider use of alternative fuels may promote important social objectives, it is far from clear that purchasing a vehicle capable of using alternative fuels or using the fuel itself will be seen by an individual consumer to be in his or her interest.

I also wish to address two common misconceptions involving manufacturer sales mandates. The first misconception is that sales mandates would be easy to implement as a matter of law. Part of the problem with any mandate to "sell" or "offer to sell" a specified number of vehicles is that under the laws of many states, manufacturers are themselves prohibited from selling vehicles directly to consumers. Only new motor vehicle dealers, who are independent businesspeople, can sell cars in those states. In addition, under federal law and the laws of 46 states, manufacturers are also prohibited from requiring a dealer to accept delivery of vehicles that the dealer has not voluntarily ordered. The general rule is that the manufacturer must sell to the dealer --

and cannot sell vehicles that the dealer has not ordered -- and that the dealer in turn will sell to the ultimate purchaser.

Any attempt to mandate manufacturers to sell set volumes of alternative fueled vehicles thus raises several unanswered questions. First, how can a manufacturer be liable for failing to sell alternative-fueled vehicles to consumers when the manufacturer is prohibited by state laws from selling vehicles directly to consumers? Second, would a dealer, who is an independent businessperson, have an obligation to order and purchase alternative-fueled vehicles from manufacturers or to sell the vehicles to the consumer? Finally, what recourse would a manufacturer have if a dealer refused to order and sell alternative-fueled vehicles, due perhaps to consumer reluctance to buy them? These are not easy questions, but they should all be answered before any program involving manufacturer sales mandates is implemented.

We note that Senator Chafee's proposal appears to attempt to address some of these difficulties by requiring that vehicles be provided to dealers on a consignment basis during the first year of a program in any area. Implementation of such a scheme, however, would represent a radical and untried change in the way our industry does business. As such, it would raise numerous other problems and still would not answer many of the difficult questions surrounding manufacturer sales mandates.

A second common misconception is that even relatively substantial sales mandates -- amounting to roughly 30 percent of sales in designated non-attainment areas -- would not unduly burden the engineering and manufacturing resources of most manufacturers. Many appear to believe that each manufacturer could meet such sales mandates simply by converting only one or two of its more popular vehicle models and offering them for sale only as alternative-fueled vehicles in these areas. This impression ignores the realities of today's increasingly competitive vehicle market, in which consumers enjoy a record number of choices from a record number of sources. Because so many models are offered to consumers, even the most popular car models today account for a relatively small percentage of total sales.

Thus, it is unlikely that many manufacturers, including GM, could meet ambitious sales targets with a small number of related models. This problem would be made even more difficult if mandates were to require set sales volumes in each non-attainment area included in the alternative-fuels program rather than setting overall targets, since our market research suggests that consumer tastes among models vary significantly across these areas.

In summary, General Motors wishes to stress that we remain firmly committed to the development of alternative-fuel vehicle technology. But we must also stress that the transition to the wider use of alternative fuels must be carefully considered and managed. In particular, we believe that consumer acceptance will be the crucial element in bringing about an orderly and successful transition. Thus legislative and regulatory initiatives to speed the transition to the wider use of alternative fuels should focus on consumer incentives. Manufacturer sales mandates, by contrast, have no legitimate role to play in this transition. In addition to the substantial practical and legal problems such mandates would create, they represent an ineffective approach to obtaining wider use of alternative fuels. Such mandates ignore the considerable power of consumers to reject potentially costly new alternatives that provide them with few or no direct benefits.

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Testimony of Richard E. Ayres
National Clean Air Coalition

before the

United States Senate
Committee on Environment & Public Works

January 11, 1990

Mr. Chairman, Senator Chafee, members of the Committee. I am Richard Ayres, senior attorney with the Natural Resources Defense Council and Chairman of the National Clean Air Coalition. I am pleased to testify today on behalf of the Coalition and its nearly three dozen major environmental, public health, labor, civic and religious organizations with a membership exceeding 20 million Americans.

Today the Committee will consider several proposals to stimulate new ways to reduce emissions from motor vehicles. Before responding directly to these proposals, I would like to comment on the context in which this discussion is occurring.

For more than 20 years urban smog has been recognized as one of our nation's major public health problems. Almost 20 years ago, our government promised that Americans would have healthful air to breathe in less than a decade.

In the ensuing years nothing we have learned about air pollution has lessened the level of concern. To the contrary. With each passing year's research, the scientists' certainty, and their estimate of pollution's toll, has grown apace. In just the past year this Committee has heard a parade of doctors and researchers describe new and more powerful studies indicating structural damage to the lung from ozone; and finding that ozone levels below today's federal health standard degrade lung function.

But government's response has not kept pace. A pattern of computerized pollyanna-ism has developed. Proposals for tough pollution control measures have been met repeatedly with the argument, based on computer projections, that further controls are unnecessary to attain healthful air quality. I participated in one such exercise in 1980, as a member of the National Commission on Air Quality. I confess that we were just as wrong as the other forecasters.

The Commission predicted that, by 1987, motor vehicle emissions of hydrocarbons in major cities would amount to only about 25% of total emissions. On the basis of computer projections, the majority of the Commission was convinced that only a handful of cities --- seven for ozone and two more for carbon monoxide --- would fail to achieve the health standards by

1987. Based on these predictions the Commission felt no need to urge improvements in motor vehicle standards.

But the predictions were tragically wrong. Today, motor vehicles continue to contribute twice the emissions predicted by the Commission. As a consequence, the air remains unhealthy to breathe in more than 100 metropolitan areas.

In a few weeks the United States Senate will take up S. 1630. It is a good effort, which we support in most respects. But it asks Americans to accept dirty, unhealthy air for as much as 20 more years in some metropolitan areas.

Given this fact, we believe Americans have a right to demand that their government will pursue every potential avenue for reducing emissions.

In my view, that is the real issue before you today, and on the floor of the Senate. The long deadline extensions of S. 1630 can be justified only if the Senate can assure Americans that the law will require every measure to cut our exposure to unhealthy pollution.

Some are urging a different kind of auto emissions control policy --- a policy based on what might be called the "dirty air two step."

In the first step, the nation's past failure to achieve healthy air quickly becomes the excuse for extended deadlines for attaining health standards. Then, in the second step, these extended deadlines are used as to justify rejecting additional measures to cut emissions, on the grounds they are not needed to meet the deadlines!

This line of reasoning is now being used to argue to you that adopting an alternative fuels program makes the Senate's Second Round of tailpipe standards unnecessary.

We disagree. We believe our government is obliged, in view of the long deadline extensions contained in this bill, to adopt a policy of pursuing the full public health benefits available from further tailpipe improvements and alternative fuels.

The Motor Vehicle Program of S. 1630

We strongly support the motor vehicle control program contained in S. 1630 and are committed to working for its enactment. S. 1630 would require substantial reductions in tailpipe and evaporative emissions from cars and trucks, improved quality control and durability, and measures to control burgeoning traffic congestion.

"First Round" ("California") Standards. The bill's "First Round" standards represent a necessary interim step towards a truly clean automobile. The committee's standards for heavy duty vehicles are also significant, though unnecessarily delayed.

These standards are environmentally superior to the numerically similar standards of the Dingell-Waxman compromise. This is because S. 1630's longer warranty will assure greater durability; and because of the extended phase-in and separe "in-use" emission limitations in the Dingell-Waxman proposal.

Technology-Forcing "Second Round" Standards. We also stongly support S. 1630's "Second Round" tailpipe standards. These standards would cut in half the mid-1990's tailpipe emissions of all three of the major pollutants from all new cars --- providing benefits for every area, whatever its size or pollution problem.

Today's high technology emissions controls would not exist had Congress not embraced the concept of technology forcing in the 1970 Clean Air Amendments. As a technological matter, S. 1630 asks for considerably less than was asked then --- just refinements in an existing technology, on an extended 14 year schedule. But it would continue to apply pressure for further development of a truly clean car.

I do not think you should believe the auto industry and others when they argue that the Second Round standards will be expensive. Projections of the cost of technology still 14 years away border on the fanciful at today's rapid rate of technological change. EPA's high cost estimates, to take one example, proceed from assuming there will be no advances in catalyst durability over the next 14 years. In this connection, the Committee should recall that the first crude catalysts were just beginning to be installed 14 years ago. In technological terms, 14 years is a lifetime.

Dingell-Waxman Approach Inadequate Some will argue for the approach embodied in the agreement reached between Representatives Dingell and Waxman last fall. In our view, the Dingell-Waxman agreement is not an adequate motor pollution control policy. As we said at the time it was announced, the agreement will "not achieve the emissions reductions from motor vehicles that are needed and achievable." At the time, we regarded it as politically significant from the point of view of breaking the logjam in the House. Unfortunately, even that hope has not been realized.

"CLEAN VEHICLES" AND FLEETS

In the most polluted metropolitan areas, the motor vehicle control program of S. 1630 will not be sufficient to attain healthy air quality by the turn of the century.

"Clean fuel" vehicles should be required Thus we support amending S. 1630 by adding a program to require, beginning in the mid-'90's, the production and sale in our worst polluted areas of a substantial number of vehicles whose total hydrocarbon pollution (exhaust, evaporative, and refueling) is significantly less than gasoline vehicles of the same model year. To produce the environmental benefits that our dirtiest cities need, both the performance standards and the required number of clean fuel vehicles should be designed to accomplish major additional pollution reductions.

In our view the reductions promised in the President's clean fuels proposal should serve as the minimum cleanup objective: reductions equal to those produced by requiring 30% of new car sales to meet standards for total ozone-forming hydrocarbons that are 80% cleaner than total emissions from gasoline cars that meet S. 1630's round one vehicle requirements. Clean fuel vehicles should also achieve comparable reductions in toxic emissions.

We are concerned that the January 5 proposal circulated with the Committee's invitation to testify does not require passenger cars to meet a level 80% cleaner than "round one" gasoline cars. Instead, the January 5 proposal stops at a 40% control requirement, with the 80% control level required only for fleet vehicles. In our opinion this would result in a substantially smaller emission reduction from alternate fuels than would be achieved by the President's program

A separate fleet program. We support provisions requiring new fleet vehicles to reduce hydrocarbon emissions by at least 80 per cent in phase one of an alternate fuel program (with comparable reductions in toxic emissions). Using "clean fuel vehicles" in fleets offers a major opportunity for reducing pollution. Fleets travel more miles per vehicle in crowded urban areas, and the logistics of fueling are easier to handle.

Unfortunately, the January 5 proposal would allow these fleet vehicles to be used to satisfy the "clean fuel vehicle" production and sale requirement, reducing the number of "clean fuel vehicles" that need be sold to the public. Fleet vehicles could not be created against these requirements under the California-New York proposal. In this respect the California - New York proposal is superior, since such credit would result in less overall pollution control.

Support for Bus Program S. 1630 also phases in an alternative fuel program for new buses. By 1994, all new buses in metropolitan areas larger than 1 million population would have to be alternative fueled. We favor this important step toward cleaner urban air.

Both the California-New York and January 5 proposals would write into the Act the 0.1 g/bhp-hr standard for diesel buses; the California-New York proposal would also require retrofitting to these standards. In light of the number of diesel buses and trucks that will continue to be operated far into the future, these requirements are also very important.

Defining "clean fuel". While each alternative fuel has its advocates and detractors, from our standpoint the key consideration is the impact that each fuel would have on the environment. Thus, we would oppose programs that would rely on methanol derived from coal because that fuel cycle would aggravate already enormous threat posed by global warming. In our view the program should emphasize emissions performance and not include criteria that tilt toward one fuel over another. A program that relied on several fuels rather than one fuel would be desirable.

Clean fueled vehicles should be required not only to reduce organic emissions and toxics in the aggregate but also should not increase emissions of other pollutants. Thus, the bill should require clean fueled vehicles to meet federal standards for nitrogen oxides and carbon monoxide. In addition the bill should require EPA to set standards for formaldehyde and carbon dioxide to insure that clean fueled vehicles do not release more of these pollutants than do state of the art gasoline vehicles. In the case of CO_2, the standard should explicitly consider emissions over the entire fuel supply cycle.

Making the Program Workable. To work, an alternate fuel program must impose an obligation on automakers and fuel suppliers to produce and sell the clean fuels and vehicles in the required quantities. A program (such as the "Hall-Fields amendment" on the House side) that fails to do this is a sham.

Now, industry has argued against this, claiming it should not be held responsible for consumers' choices. I disagree. Who more than designers and suppliers of a product should take the responsibility for making and pricing it so that consumers will want to buy?

The fuel and auto companies are the ones who will make the engineering, design, marketing and pricing decisions for their products. These decisions will determine the attractiveness the fuels and vehicles to consumers. If these companies are not held responsible for insuring sales then no one will be responsible. The result will be a program that will fail; paper compliance by industry, producing "example" vehicles that are not bought in significant numbers because the manufacturers have not tried to make the products desirable.

"Opt-Out". Another major issue is the question of authority for states to "opt out" of the clean fuels program by showing that the program is "not needed" to achieve air quality standards by the new delayed attainment dates in the law.

This is a prime example of the "dirty air two-step" I have mentioned. It is simply not acceptable public policy to turn S. 1630's delayed attainment dates into a "right to pollute" until as late as 2010. Yet this is the result if available control strategies, such as clean fuels, can be avoided based on a claim that they aren't needed to meet the standards by 2010.

Adopting such pollution controls will reduce the levels and frequency of unhealthy pollution even if complete attainment is not achieved. To legislate permission to ignore opportunities for reducing the health damages of air pollution would not be responsible. An "opt out" provision would mock the title "Clean Air Act" and does not belong in a law that bears that name.

California-New York Proposal The California-New York "clean fuel" proposal, as we understand it, has the objective of achieving at least as large an emission reduction from alternative fuels as the President's proposal. Indeed, over time as federal emission standards for gasoline-powered cars are tightened, the California-New York approach could achieve even greater reductions.

The California-New York proposal proceeds from the sensible idea that a "clean fuel" vehicle ought to emit substantially less pollution than a gasoline-powered vehicle. "Clean fuel vehicles" would be defined as having reactive hydrocarbon emissions half of the applicable federal standard. As the federal standard became more stringent under S. 1630's "Round II," so would the standard for "clean vehicles." Since the definition is in terms of performance, the proposal is fuel neutral.

The proposal would require "clean fuel" vehicles to meet a formaldehyde standard at least as stringent as California's, and would disqualify any vehicle fuel combination that would increase greenhouse gas emissions.

Clean fuel programs would be required in extreme, severe, and larger serious ozone non-attainment areas. The program would be phased in beginning in 1994 in California and in 1997 in other covered areas. Fuel suppliers would be required to sell the needed fuel.

It is our understanding that the intent of the California-New York proposal is to require 30% of passenger car sales to be "clean fuel" vehicles, although this is not specified in the materials we have seen. It would be helpful if the two States would clarify this point.

In sum, Mr. Chairman, we believe that the Committee should take this opportunity to supplement its Round I and Round II tailpipe control plan with effective "clean vehicle" and fleet alternative fuels programs applicable in our most polluted cities. In view of the long delays projected for attaining healthful air quality in these metropolitan areas we believe that Americans will and should expect that every available measure will be used to cut their exposure to health-endangering pollution.

ARCO Products Company

Statement Before The
Senate Environment and Public Works
Subcommittee on Environmental Protection
By George H. Babikian
January 11, 1990

INTRODUCTION

Good morning (afternoon). My name is George Babikian. I am President of ARCO Products Company, a division of Atlantic Richfield Company (ARCO). ARCO Products Company is a major manufacturer and marketer of petroleum products in the five Western states. We appreciate this opportunity to share with the Subcommittee our views on how alternative fuels, and in particular, reformulated gasoline, can fit into a Clean Air regulatory scheme.

EC-1

Before I address how reformulated gasoline should be a part of our clean air future, I would like to illustrate the potential of reformulated gasoline by telling you about our efforts to produce and market the first in a series of reformulated gasolines. As you may know, on September 1, 1989 ARCO introduced an environmentally engineered gasoline called EC-1 Regular in Southern California. "EC" stands for emission control. EC-1 is formulated to reduce emissions from older vehicles, those without catalytic converters, that were manufactured to run on leaded gasoline. These cars and trucks only represent about 15% of the on-road vehicle population in Southern California and travel about 10% of the total miles travelled; yet, they produce over 30% of the vehicular pollution.

EC-1 is formulated to decrease the overall level of emissions from these vehicles, including toxic components, and to reduce the ozone reactivity of the unburned fuel or hydrocarbon portion of these emissions. Specifically, we did the following to formulate EC-1:

- Reduced RVP to a psi one pound below California standards (all year);
- Reduced aromatics and olefins by one-third (aromatics from 30% to 20%, olefins from a 30 bromine number limit to 20 bromine number);
- Removed the lead;

- Cut benzene by 50% (2% to 1%)
- Reduced sulfur by 80% (1500 ppm to 300 ppm)
- Added about 6 volume % MTBE (1.0 weight % oxygen) to make up for octane lost from removing lead and aromatics.

The octane of EC-1 is 88, the same as the octane of the leaded gasoline that it replaced.

ARCO tested the performance of the fuel in two nationally recognized independent laboratories (Southwest Research Institute and National Institute for Petroleum and Energy Research) which have performed similar tests for the EPA and the California Air Resources Board.

Fleet test results showed statistically significant reductions of the regulated emissions. If all vehicles in Southern California that use leaded gasoline were to use a gasoline similar to EC-1, the pollution reduction would be over 350 tons per day. The regulatory agencies that wrestle with ways to reduce emissions, the South Coast Air Quality Management District and the Air Resources Board, frequently look at control measures that would reduce emissions by just a few tons per day, so 350 tons per day is very significant. This level of emissions reduction is equivalent to removing 20% of these older vehicles from the road. Specifically, exhaust hydrocarbons were reduced about 4% while evaporative hydrocarbons were reduced about 21%, exhaust carbon monoxide was reduced about 9% and nitrogen oxides were reduced about 5%. Benzene emissions were also reduced about 40%.

EC-1 is the most significant single step taken to reduce air pollution from vehicles since the introduction of the catalytic converter on 1975 model year cars.

EC-1 is refined at the ARCO Refinery in Los Angeles. We can only make about 28,000 barrels per day (35 million gallons per month) of EC-1 with our present refinery equipment. This is only about 20 percent of our total gasoline production at Los Angeles. This limited production capability is one reason why we have used it as a replacement for leaded gasoline. The other reason is that it does the most good in the old cars that do the most polluting.

Sales of EC-1 have been encouraging. They are higher than our projected sales of leaded gasoline, had it not been replaced by EC-1. ARCO has about one-third of the leaded gasoline market.

It costs us about 2¢ per gallon more to make EC-1, but we are not passing this additional cost to our service station dealers. Service station dealers generally use leaded regular gasoline as a price leader and thus if we raised the price of EC-1 to cover our costs, we could drive away the price conscious buyer. That would defeat what we are trying to accomplish -- a reduction in emissions from the worst polluters, the pre-1975 cars and pre-1980 trucks without catalytic converters.

EC-1 TESTING IN NEW CARS

We have also done some limited testing of EC-1 in state-of-the-art 1989 model cars and are very encouraged by the preliminary test results. The percentage reduction in exhaust emissions in the new cars is about the same, or in some cases the reductions are better, than the percentage reductions in the old cars.

For example, limited testing on five 1989 low-mileage vehicles shows about a 12% reduction in exhaust hydrocarbons (vs about 4% in non-catalytic vehicles), about a 22% reduction in carbon monoxide (vs about 9% in non-catalytic vehicles) while nitrogen oxide emissions are cut about 3% (vs about 5% in non-catalytic vehicles). The reduction in benzene emissions in both the new and the old cars is about 40%. These new cars have very low evaporative emissions. As a result, we found no reduction in evaporative emissions from the new cars while the old cars showed an evaporative emission reduction of about 21%.

These findings encourage us to continue our research to develop an even cleaner gasoline. As such, EC-1 is the first in a series of "emission control" gasolines. The next in the series will be made for use in the newer cars. It will be several years before the reformulated gasoline for newer cars will be available for two reasons. First, the right formula must be developed. We are participating in a joint oil/auto research program that will provide insights into a range of gasoline formulations. ARCO is also conducting independent research to try to develop a low emission fuel that is practical. Second, substantial modifications to our refineries will be necessary to produce the required volume of fuel. The design, permitting and installation of new refinery equipment will require a lengthy period of time.

REFORMULATED GASOLINE IN CLEAN AIR REGULATORY SCHEME

Emissions testing of EC-1 gasoline in old and new cars, although limited, clearly establishes that there is significant potential for reducing vehicular emissions by reformulating gasoline. And, we believe that reducing emissions from fuels/vehicles will clearly be necessary for some areas of the country with the worst ozone nonattainment problems to ever achieve the ambient air quality standard for ozone.

The question then is, how should an alternative fuels/vehicles program be implemented?

We believe that the alternative fuels provisions approved by the House Subcommittee on Health and the Environment, which is the Administration proposal as amended by the Hall-Fields amendment, is a reasonable approach. We recognize that there are likely to be further amendments to the Hall-Fields language, but we believe that the basic approach is sound.

Therefore, we recommend that the Senate include an alternative fuels provision similar to the Administration proposal as amended by Hall-Fields in S. 1630.

Below are elements that we believe should be included in any alternative fuels program:

- Any fuel requirements should be "fuel-neutral". That is, no single fuel should be mandated.
- Reformulated gasoline should be included in the definition of "alternative fuel".
- Performance standards should be established for fuels and vehicles. Industry should be allowed to determine the most cost-effective way to achieve the performance standards.

  The performance standard could be based on (1) a marker fuel (M85) as currently in Hall-Fields, or, (2) a reasonable, cost-effective percentage reduction in emissions from a conventional gasoline-fueled vehicle.

FUEL COMPOSITION

S. 1630 contains a section on "fuel quality standards", §217, that would give the EPA unlimited authority to set nationwide specifications for motor vehicle fuels. As explained by your Committee's counsel, this provision would allow EPA to "establish by regulation requirements to sell other fuels -- methanol, ethanol, and compressed natural gas in areas -- if the Administrator believes that is the most effective strategy."

We are concerned that EPA could exercise this authority to mandate a nationwide alternative fuels program without reference to costs or impact on energy security, and possibly without fully considering the air quality benefits. With such a provision in the law, we would not have sufficient certainty that reformulated gasoline has a future beyond the next hearing by EPA. Under these circumstances, we could not make the investments necessary to upgrade our refineries to produce cleaner fuels, even if these fuels met the standard at the time.

The Administration's alternative fuels proposal, as amended by

Hall-Fields, represents a much more balanced approach to determining what changes in fuels are needed to help attain national ambient air quality standards.

EPA already has authority to regulate fuel composition under the current Clean Air Act. For example, EPA has exercised its authority under §§114, 211 and 301 to regulate gasoline volatility and its authority under §§114, 202, 206, 207, 208, 211 and 301 to control the sulfur and aromatics content of diesel fuel.

We recommend deletion of §217 from S. 1630 and substitution of an alternative fuels provision, as described above, in its place.

GASOLINE VOLATILITY - RVP

As I mentioned, one of the changes we made with EC-1 was to reduce the vapor pressure (RVP) one psi below the California standards. In the summertime, this means that the RVP of EC-1 is at 8 psi. We believe that gasoline RVP should not be reduced below 8 psi for two reasons. First, the California Air Resources Board has estimated the gasoline related emissions from both mobile and stationary sources and found that emissions reach a minimum at 8 psi and actually begin to increase at about 7.2 psi. This net increase begins to occur because (1) as the RVP of gasoline is reduced, the hydrocarbons in the vehicle exhaust increase, and (2) once the RVP reaches about 7.2 psi, the reduction in evaporative emissions from the vehicles, storage tanks, etc. is not enough to offset the increase in exhaust emissions. The State of California is in the process of adopting further controls on gasoline and has not proposed going below 8 psi.

Second, evaporative emissions will be minimized and there will be no need for RVP reductions below the RVP of the certification fuel (9 psi) after the following occurs: (1) a standard is established for running losses, (2) the summertime in-use gasoline is at the same vapor pressure that vehicles are designed and tested on, and (3) most of the cars on the road are designed to minimize total evaporative emissions.

§214 of S. 1630 would require that gasoline in ASTM Class C areas not exceed 9 psi and would require proportional reductions in areas other than Class C. This means that Class A areas would be required to go to 7.0 psi.

We recommend that §214 be amended to (1) place an 8.0 psi floor on RVP reductions and (2) provide EPA the flexibility to allow a 9.0 psi RVP in the summertime in all ASTM areas when most of the vehicles on the road are those designed to minimize evaporative losses. As we mentioned above, when we tested EC-1 in new vehicles, we found that the evaporative emissions from these vehicles are so low that the one psi lower RVP in EC-1 did not reduce the evaporative emissions.

OXYGENATE REQUIREMENT

§218 of S. 1630 would require a minimum of 3.1 weight percent oxygen in gasoline in carbon monoxide nonattainment areas from October 1 to March 31 of each year. We are concerned that such a requirement is, in effect, an ethanol mandate since ethanol is the only oxygenate in common use that is allowed at that high a level by EPA regulations. We do not believe that a marketable oxygen credits program would be workable, so oxygenates other than ethanol would be excluded from the marketplace.

As I mentioned before, we are using one weight percent oxygen in EC-1 and the carbon monoxide reductions are substantial. We recommend a 2.0 weight percent oxygen level since that level would provide nearly as much a CO reduction as 3.1% oxygen while allowing the consumers a choice of fuels. Other oxygenates such as MTBE and ETBE could also be used at 2.0% oxygen.

OTHER CONSIDERATION FOR REFORMULATED GASOLINE PRODUCTION

Although reformulated gasoline has significant potential as an emission control strategy, its potential will not be realized unless the fuels industry is able to obtain the necessary permits to construct and operate the new processing units that will be required to produce this new fuel. Under the current Clean Air Act it is very difficult and time consuming to obtain permits in nonattainment areas. We are concerned that with the additional permitting requirements included in S. 1630, the current very difficult system will become almost impossible. The provisions that concern us include: the 2 to 1 offset ratio for volatile organic compound and nitrogen oxide emissions; the elimination of netting and bubbling; and, a federally directed uniform permits and fees program with five year permits and renewals subject to modification.

These provisions would, of course, also apply to the construction of facilities to produce alternative fuels other than reformulated gasoline. Therefore, the production of any alternative fuels in the U.S. could be limited or ruled out. There must be some flexibility and stability in the permitting process to allow industry to make the investments necessary to achieve air quality goals.

The production of reformulated gasoline or other alternative fuels will be enormously expensive. For example, ARCO estimates that an investment of $1 billion at **each** of our two West Coast refineries could be required to make cleaner burning fuels. In order to make that kind of commitment, we need some assurance that we can get the necessary permits and be able to operate the new equipment for a long enough period to recover our investments.

Consideration should be given to providing emission offsets for facilities that produce low emission products such as reformulated gasoline. Reasonable further progress toward attainment would, of course, have to be maintained.

ALTERNATIVE FUELS PROPOSAL DATED JANUARY 5, 1990

We reviewed the Alternative Fuels Proposal dated January 5, 1990 that was provided by the Committee. Below are our comments.

Toxics Reduction

The proposal calls for two performance standards for fuels and vehicles. The first performance standard would require a 50% reduction in toxic emissions and the second performance standard would require a 90% toxics reduction.

It is not clear how these reductions would be measured.

> Would the percentage reductions apply to (1) certain individual toxic compounds, or (2) the aggregate of certain toxic compounds, or (3) an average of certain toxics?
>
> Are these overall (including exhaust, evaporative and refueling) reductions, or just exhaust?
>
> Would the reductions in toxics resulting from control measures to reduce ozone-forming volatile organic compounds be considered in the calculation of toxic reduction percentages?

We have the following comments concerning the establishment of toxic compound reduction targets.

- Any targets should be technically feasible and cost-effective relative to other toxic emission control measures, while ensuring that public health goals are met.
- Any percentage reduction targets should apply to the aggregate mass emissions of certain toxic compounds, e.g. benzene, 1,3-butadiene, formaldehyde, -- not to individual compounds.
- All emission reductions associated with the fuel and

vehicle (tailpipe, evaporative, refueling) must be considered when determining toxic emission reductions.

Although reformulated gasoline has significant potential for reducing toxic emissions, the entire burden should not be placed on the fuel. EC-1 in the non-catalytic vehicles resulted in about a 40% reduction in benzene and xylene emissions. Emissions of 1,3-butadiene were down about 2% and formaldehyde was up about 17%.

- Mass emission reductions associated with more stringent tailpipe standards and evaporative emission controls (running losses, refueling, etc.) will result in substantial reductions in toxic emissions. Therefore, it may not be necessary to have a separate toxics reduction target.

  For example, the "clean fuel" and "ultra-clean fuel" performance standards call for a 40% reduction and an 80% reduction in VOC emissions. Roughly comparable reductions in toxic emissions should also occur.

  If a separate toxics reduction target is established, any reduction in toxic emissions that result from VOC control measures should be credited toward the target.

Mandate To Sell Fuel

We are opposed to any requirement to sell a specific volume or percentage of "clean fuels" for these reasons:

- If the low-emission vehicles that come into the marketplace are capable of using M85, they will be flexible-fuel vehicles. That means that the consumer would have the option of using either M85 or gasoline. If for some reason the consumer does not want to purchase M85, even with our best efforts to price the fuel appropriately, to advertise effectively, etc., we may still not be able to meet the sales requirement.
- Monitoring and enforcing the actual sales figures will require a large, bureaucratic effort on the part of both industry and government.
- The production costs of some clean fuels could prove to be higher than the consumer will accept. If, for example, the clean fuel is methanol, it could cost 10 to 40 cents per gallon gasoline-equivalent more than premium gasoline. A mandatory sales requirement would mean one of two things: (1) it is a mandate to sell methanol at a loss to ensure that it is purchased, or, (2) it means that the price of

gasoline would have to be increased to subsidize methanol. We believe that if any alternative fuel is to be subsidized, it should be out in the open as a public subsidy.

Instead of a mandatory sales requirement, we recommend an approach that would require every service station serving a non-attainment area to have at least one "clean fuels" pump. Furthermore, the fuel marketer could be required to "be capable of selling" a minimum percentage of clean fuels in his sales mix, where the percentage is based on the number of low-emission vehicles in the light duty vehicle fleet.

Marketable Credits

We are opposed to a marketable credits program for fuels. Such a program would be very difficult to administer and enforce. It would likely provide numerous opportunities for cheating.

We do believe, however, that some type of company internal credit program is necessary to get us through periods when we have to shut down processing units for maintenance. Fuel producers should be able to internally accrue credits for fuels that are cleaner than required, or for producing a volume that is greater than required. Those credits could then be used to offset the occasional production of their own fuels that are not as clean as required.

Attached are responses to questions provided by the Committee prior to the hearing.

Again, we appreciate the opportunity to share our views with the Committee on these important issues. I would be pleased to answer any questions.

RESPONSES TO QUESTIONS

1. To what extent can alternative fuels contribute to improved air quality? Using existing pollution control technology, what impact would the various alternative fuels, including reformulated gasoline, have on hydrocarbon and nitrogen oxide emissions from vehicles (on a per vehicle basis) in use? What is your database for calculating these emission reductions? Are these retrofit, experimental or production vehicles? How many vehicles? How many miles have these vehicles been run?

Response

The emissions reductions with the use of EC-1 are included in the main portion of our statement.

The alternative fuel contribution to reduction in peak ozone is a function of the hydrocarbon to nitrogen oxides ratio in a particular air basin. Therefore, the contribution will be different for each air basin. The reduction in peak ozone can vary even within a large air basin such as the California South Coast Air Quality Management District. Alternative fuels are primarily a volatile organic compound (VOC) reduction control strategy and are only effective in air basins that are VOC limited. For example, Houston has a high hydrocarbon to NOx ratio so VOC control strategies, such as the use of alternative fuels, are not effective in reducing peak ozone.

2. To what extent would emission of air toxics from vehicles and from fuel handling be reduced by the use of various alternative fuels?

Response

As mentioned in our statement, the use of EC-1 in non-catalytic vehicles reduced benzene and xylenes about 40%, 1,3-butadiene was down 2% and formaldehyde was up 17%. EC-1 in the 1989 vehicles produced comparable results.

3. Would emissions of other air pollutants be increased or more difficult to control from vehicle throughout their useful life using alternative fuels?

Response

As mentioned above, formaldehyde emissions increase to some degree with the use of EC-1. This results from the use of an oxygenate, MTBE, in the fuel.

4. What are the global warming implications of various alternative fuels when the entire fuel cycle is considered?

Response

We have not done an independent analysis of the global warming implications of the use of alternative fuels.

5. Are there other health, safety or environmental implications, either positive or negative, associated with the various alternative fuels?

Response

We have not conducted independent studies of the health, safety and environmental implications of alternative fuels.

6. How reliable is the data that is currently available with respect to each of the alternative fuels and questions 1-5? If additional data is necessary before an alternative fuels program is implemented, how should that data be acquired?

Response

A substantial quantity of additional data on reformulated gasoline will be available as a result of the oil/auto research program that has been initiated. Such a joint effort is the preferred method of obtaining data on vehicle emissions.

Additional data on health, safety and environmental implications of alternative fuels should be obtained through an independent scientific group or a joint effort between interested parties so the information is as unbiased as possible.

An independent analysis of the existing information on the ozone and toxic emission reduction potential of M85 should be conducted.

An independent study to determine the need for, and feasibility of, controlling emissions of toxic air pollutants from motor vehicles/fuels should be conducted.

7. What is the most likely application for each of the alternative fuels (i.e., passenger cars, delivery vehicles, fleet vehicles, transit buses)? In which nonattainment areas should alternative fuels be used? What are the economic parameters of the most likely applications (including vehicles costs, fuel costs, and distribution infrastructure costs)? What factors other than costs will influence consumer acceptance of the vehicles or the fuels?

Response

The big advantage of reformulated gasoline is that it can be used in all vehicles designed to use conventional gasoline. Because of the limited distribution system, other alternative fuels, e.g. CNG, LPG, methanol, may be used in niche markets such as fleet vehicles and transit buses.

As mentioned in the response to question one, alternative fuels are primarily a volatile organic compound (VOC) reduction control strategy and should only be used in those ozone nonattainment areas that would benefit from a reduction in VOCs.

Factors other than costs that will influence consumer acceptance include: fuel availability, refueling frequency, length of time to refuel, and vehicle performance.

8. If alternative fuels can make a substantial contribution to improved air quality, how do we assure that the vehicle and fuels are produced and sold? What role should the Federal Government play? the States with serious air quality problems? the auto and oil companies? fleet owners? others? What impact does an alternative fuels program have on other sectors of the automobile and fuels industry (i.e., car dealers or service station dealers)?

Response

As indicated in our statement, if an alternative fuels program is implemented, we recommend an approach that would require every service station serving a nonattainment area to have at least one "clean fuels" pump. Furthermore, the fuel marketer could be required to "be capable of selling" a minimum percentage of clean fuels in his sales mix, where the percentage is based on the number of low-emission vehicles in the light duty vehicle fleet.

The federal government should assist the states with estimating emissions reductions, air quality modelling, etc. to determine if an alternative fuels program would be effective in helping to attain the federal ambient air quality standards, and if it is cost-effective relative to other control measures that could be implemented within the specific air quality control regions.

The federal government should establish technologically feasible, cost-effective performance standards for fuels and vehicles. The oil and auto industries should be allowed to determine the best way to achieve those performance standards.

The impact of an alternative fuels program on service station dealers will depend on the requirements of the program. For example, if the alternative fuel is reformulated gasoline, the impact on the dealer would be minimized. He would not have to install any new equipment, since reformulated gasoline would be compatible with the existing service station equipment and the volume of product sold would be the same.

On the other hand, if the alternative fuel is M85, a number of changes would be necessary:

- Methanol compatible tanks and other equipment would have to be installed;
- The volume of fuel sold would approximately double, so the dealer would have to receive twice as many deliveries and may have to install additional underground storage capacity;
- The cost of methanol is likely to be 10 to 40 cents per gallon higher than premium gasoline. If the price to the dealer is that much higher than gasoline, the volume of M85 sold will likely be low, making it difficult to recover the investment for new tanks, etc.

9. Are there modifications to existing gasoline or diesel fuels beyond the reduction in RVP required by S. 1630 which would contribute to hydrocarbon or oxides of nitrogen emissions reductions from vehicles in the existing fleet? Are there gasoline or diesel fuel modifications which would lead to significant reduction in emissions of air toxics or other pollutants from the existing fleet? What are the cost of such modifications? How might the modification be implemented in the most cost-effective way (where should the modifications be required; which existing vehicles should be using the modified fuel)?

Response

As mentioned in our statement, EC-1 results in substantial reductions in hydrocarbon, nitrogen oxide, carbon monoxide, benzene and xylene emissions from both non-catalytic and catalytic vehicles. It is currently costing ARCO about 2 cents per gallon above the cost of leaded regular to produce EC-1. The cost is relatively low since we are able to produce this fuel in a limited volume without modification to the existing equipment at our Los Angeles refinery. Some refineries may not be able to produce any significant volume of gasoline that meets the specifications of EC-1 without the refinery modifications. We estimate that the production of reformulated gasoline in sufficient volume to fuel all light-duty motor vehicles will cost in the range of 5 to 15 cents per gallon more than conventional unleaded gasoline. The cost will, of course, depend on the specifications.

S. 1630 also calls for a diesel fuel with 0.05% sulfur and a 40 cetane index minimum. Those specifications are consistent with a compromise reached between the engine manufacturers and the fuels industry that will allow the engine/fuel combination meet the 1994 particulate standards for heavy-duty engines. We do not believe that additional changes to diesel fuel are necessary.

10. What role might reformulated gasoline play in achieving significant hydrocarbon, oxides of nitrogen or toxic emissions reductions from new vehicles (engineered to take full advantage of the reformulated gasoline potential)?

Response

The oil/auto research program should help answer this question.

STATEMENT OF

Michael E. Canes

THE AMERICAN PETROLEUM INSTITUTE

BEFORE THE
SUBCOMMITTEE ON ENVIRONMENTAL PROTECTION
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS
UNITED STATES SENATE
ON
ALTERNATIVE FUELS

WASHINGTON, D.C.

JANUARY 11, 1990

INTRODUCTION

I am Michael E. Canes, Vice President for Finance, Analysis and Statistics at the American Petroleum Institute (API). I commend you, Mr. Chairman, for holding this hearing on alternative fuels before the Senate considers the amendments to the Clean Air Act (S. 1630).

API represents over 200 companies engaged in all aspects of the petroleum industry. API's members have been active in research and development of alternative fuels. As major manufacturers and sellers of motor fuel, API's members have a vital interest in legislation concerning all automotive fuels. No matter what fuels are used in the future, API's members are likely to be involved in their production and sale.

The petroleum industry is strongly committed to improving our nation's air quality. Considerable progress has been made in reducing emissions from both fuels and vehicles, and there is every reason to believe such progress will continue.

The petroleum industry has made significant changes in the gasoline it produces to reduce emissions. Nevertheless, ozone nonattainment is expected to remain a persistent problem. Since EPA estimates mobile sources represent between 30 and 50% of urban inventories of volatile organic compounds (VOCs), it is appropriate to consider control measures affecting both vehicles and fuels in searching for the most cost-effective solutions.

Alternative fuel vehicles hold some promise for improving air quality. However, if cost-effective improvements are to be attained, a level playing field must be provided for all alternative fuels and vehicles. No single alternative fuel is a panacea -- all have advantages and disadvantages. No currently practical fuel is inherently clean -- all require engines and emission control systems (effective over many miles of operation) to be tailored to that fuel.

Performance standards should be set to reduce emissions of pollutants that form ozone. All fuels and vehicles that can meet these standards should be allowed to compete in the market. In setting such standards, there should be a careful, comprehensive and unbiased evaluation of the impact of all alternative fuels on ozone formation. Such an assessment is needed to allow wise public policy decisions to be made and cost-effective programs to be developed.

Given the uncertainties about the ozone reduction potential of various fuel formulations and vehicle technologies, it is important to avoid precipitous decisions that will stifle the innovation and research necessary to find the most cost-effective means of improving air quality. S. 1630 imposes mobile source controls that could reduce VOC emissions by as much, if not more, than the Administration's clean air program. Yet, S. 1630 wisely avoids the type of alternative fuel program proposed by the Administration that could result in mandatory use of one specific fuel, i.e., methanol. By avoiding such a mandate, S. 1630 provides the proper incentive for research to evaluate and develop the most appropriate fuel and vehicle systems to ensure that the attainment schedule set by this bill is met.

Both the petroleum and automotive industries recognize better data are needed and are working to develop such data through a joint research program. In particular, we believe reformulated gasolines, and vehicle modifications to take full advantage of these fuels, could have the potential to result in significant VOC reductions and thus help reduce ozone levels. And, unlike most other alternative fuels, reformulated gasolines have the advantage of being available for use in the existing fleet to achieve additional air quality benefits. This is particularly important since older vehicles emit a disproportionately large share of pollutants.

Gasoline reformulation is an ongoing process. For example, lead has been almost entirely removed, volatility reduced and oxygenates and detergents added. However, additional significant changes in gasoline properties for a large volume of fuel probably will require new investments in refining equipment and time will be needed to add such capacity.

We do not yet know which changes in fuels and vehicles will bring the greatest benefits. Time is needed for the type of joint research that we have begun with the automotive industry. Thus, efforts to set specifications for reformulated gasoline are premature and should be avoided. Furthermore, fuel specifications alone miss the importance of the fuel/vehicle system and its role in controlling emissions created during the combustion process. Instead, performance standards should be set for the fuel/vehicle system and auto manufacturers and fuel suppliers should be allowed to develop the most efficient means of meeting these standards.

My testimony begins by discussing the potential benefits of reformulated gasoline and the questions that still must be answered. It then turns to the joint research we are conducting with the automotive industry to answer some of these questions. This will be followed by a discussion of other alternative fuels -- methanol, CNG and LPG. It closes with a discussion of the legislation, including comments on the requirement that oxygenated fuels be used as a carbon monoxide reduction strategy.

REFORMULATED GASOLINE

We believe gasoline can be reformulated to reduce its ozone-producing emissions. In fact, gasoline has already been reformulated in several ways. Refiners have developed detergents and additives to ensure that engines run cleaner and more efficiently, thus helping reduce the emissions resulting from incomplete combustion.

Gasoline also has been reformulated to accomodate the phaseout of lead, while maintaining octane to meet consumers' performance demands. Unleaded gasoline now constitutes about 88% of the gasoline sold and permissible lead levels in leaded gasoline have decreased from 1.1 to 0.1 grams per gallon. Significant changes in refinery equipment and operations and substantial investments were needed to accomplish this. EPA estimated that over the five year period from 1986 to 1990 the lead phasedown program will cost the refining industry an average of $500 million per year.

The introduction of unleaded gasoline is a prime example of the need to examine both vehicle emission controls and the fuel as a total system. Catalytic converters were developed to allow cars to meet more stringent tailpipe standards -- yet these converters could not function without the use of unleaded fuel. Thus, it was the fuel and the vehicle controls together as a system which reduced emissions.

One of the most important lessons learned from the introduction of unleaded gasoline and lead phasedown in leaded gasoline was the need to provide adequate time and flexibility in making changes to gasoline at refineries. Significant changes in refinery operations were needed. More recently, refiners have made additional investments to reduce gasoline volatility. The volatility reductions adopted to date cost in excess of $500 million per year and the further reductions that S. 1630 would require could impose additional costs on the order of $1 billion per year.

Further, oxygenates (ethers and ethanol) have been added to gasoline, partly in response to local programs addressing seasonal carbon monoxide (CO) problems. Particularly in older cars, oxygenates in the fuel can help ensure more complete combustion and reduce CO emissions. However, the oxygenates themselves are costly and most of the benefits derived from their use can be accomplished at an oxygen level of 2% by weight. The requirement for a 3.1% minimum oxygen content in S. 1630 is essentially an ethanol mandate and will impose cost on consumers without providing commensurate benefits.

Mandated use of oxygenated fuels nationwide is unlikely to be cost-effective, particularly as the CO problem is diminishing due to the greater proportion of newer, cleaner vehicles in the overall fleet. Design and implementation of any oxygenated fuel program is best left to individual nonattainment areas to determine whether such a program could be cost-effective and, if so, to tailor the program to that area's specific needs.

More recently, Arco's EC-1 is one example of what might be possible with a specific type of gasoline reformulation. Arco's EC-1 test data show decreases in exhaust and evaporative hydrocarbons, carbon monoxide and nitrogen oxide (NOx). Arco's initiative is promising. However, a few words of caution are needed for those who might assume that the benefits of EC-1 could easily be replicated on a broader scale.

EC-1 is intended for use in older cars and trucks designed to run on leaded gasoline. Also, at the time Arco announced EC-1, they noted that it can be produced only in limited quantities with present refinery equipment and that it was designed for use in a specific geographic area.

Some refiners may be unable to produce this specific fuel, while others might be able to do so only at much higher costs. And, other reformulations also could prove beneficial. We simply do not have enough information to know whether this one particular formula will be the optimal approach. That is why the petroleum and automotive industries are undertaking a comprehensive research program to develop additional needed information on reformulated gasoline and other alternative fuel/vehicle systems in a timeframe consistent with the President's and Congress' goals.

JOINT AUTO/OIL RESEARCH

On October 17, we announced a joint research program to be conducted by fourteen domestic oil companies and three domestic car manufacturers to:

- measure and evaluate the potential improvements in air quality achievable through use of reformulated gasoline, alcohol and ether blends, and other alternative fuels, and of advancements in automotive technology including emission control systems; and
- evaluate the relative cost-effectiveness of these improvements.

This research is in addition to research being conducted by individual companies.

Our research will be conducted in two phases. The first phase will examine 24 different gasoline reformulations created by varying aromatics, olefins, sulfur and MTBE levels, and the 90% distillation temperature. Most of these fuels will simulate those that could generally be produced from current refineries (although the full range of test variations may not be producible in volume from current refineries without substantial and costly process modifications). These reformulated gasolines will be tested in both current model vehicles with the most advanced emission controls (1989-90 vehicles) and older cars (1983-5 model years) with a minimum of 50,000-80,000 miles. For comparison, methanol (M85 and other blends) would be tested in dual fuel vehicles being developed by the automotive industry for sale in the 1990s.

All regulated pollutants (total hydrocarbons, carbon monoxide and nitrogen oxides), as well as specific compounds such as benzene, formaldehyde, unburned gasoline components and methanol, will be measured in exhaust, evaporative and running loss emissions. We expect to complete the first phase of the program by mid-1990.

In the next phase, a range of current and the most promising reformulated gasolines (including those that may require major refinery changes) will be tested in vehicle emissions control systems planned for production in the early 1990s. These vehicles will be optimized for reformulated gasoline through changes in engine calibration (hardware and/or software), system control, and catalyst formulation. We also will test advanced methanol fuels and vehicles. This second phase will begin early this year.

Vehicle emissions data from both phases will be used in atmospheric chemistry models to determine the impacts of the various fuels on ozone concentrations in specific areas. We also will estimate the cost-effectiveness of each fuel/vehicle system in reducing ozone, taking into account potentially higher fuel and vehicle costs. For example, regarding reformulated gasoline, refiners control their operations to produce gasoline meeting the necessary quality specifications at the lowest cost. If those specifications become more restrictive, costs are likely to rise. And, if those specifications require investments in new equipment, costs will rise even further. On the vehicle side, the hardware needed to operate most effectively on reformulated gasoline (i.e., to optimize its environmental benefits) also may be more costly. Until we evaluate specific fuel/vehicle systems, we cannot fully compare the cost-effectiveness of reformulated gasoline with methanol in meeting our air quality goals. However, we do know methanol will require a new vehicle fleet and new production capacity, as well as significant changes in, and expansion of, the motor fuel distribution and storage system.

METHANOL

The auto/oil research program summarized above will provide important new data on methanol emissions and their effect on air quality. However, beyond the issue of emissions, there are other major unanswered questions about the impacts of widespread methanol use.

o **THERE ARE SERIOUS QUESTIONS ABOUT WHETHER METHANOL VEHICLES HAVE SUBSTANTIALLY LOWER OZONE-PRODUCING EMISSIONS IN ACTUAL USE AND WHETHER METHANOL REPRESENTS A COST-EFFECTIVE OZONE REDUCTION STRATEGY.**

Although further data on methanol vehicle emissions is necessary, studies to date raise questions about methanol's cost-effectiveness as an ozone reduction strategy. Sierra Research's report, "Potential Emissions and Air Quality Effects of Alternative Fuels," compares emissions from gasoline and methanol vehicles and concludes the emissions control performance from current methanol vehicles is not as good as that being achieved by some current gasoline vehicles with advanced emission control systems. If methanol vehicles are to be used more widely and if they are to help improve air quality, efficient and reliable control of formaldehyde emissions, beyond the level currently achievable over the entire life of the vehicle, will be necessary.

Emissions testing has indicated that methanol-fueled vehicles produce 3-5 times more formaldehyde than conventional gasoline vehicles. Most of these measurements are generally from low-mileage, well-maintained vehicles and are likely to underestimate actual in-use emissions since emissions control generally deteriorates over the life of the vehicle. And, even if technology is developed to improve formaldehyde control, such technology may also be applicable to further reducing emissions from gasoline vehicles.

Also, methanol vehicles can emit more NO_x -- another significant ozone precursor -- than gasoline vehicles. And, evaporative emissions from flexible fuel vehicles may be comparable to, or even higher, than those from gasoline.

Methanol's emissions must be compared to emissions from the best conventional gasoline vehicles to determine what potential benefit, if any, methanol can offer. Certification data from the California Air Resources Board indicate that some of today's engine systems, fueled on conventional gasoline, achieve emissions well below today's standards. Also, these emissions are equal to or less than those from flexible fuel vehicles running on methanol.

Recent work by GM indicates the benefit from methanol vehicles could be less than had previously been assumed. The GM study, unlike most others, compared methanol vehicles to advanced technology gasoline vehicles and found the gasoline vehicles' emissions to be up to 25% less reactive than previously assumed, leading GM to conclude "...current experimental methanol-fueled vehicles provide, at best, small ozone reductions compared to prototype gasoline-fueled vehicles." And, this does not consider further benefits which might be obtained from reformulated gasoline.

Partly as a result of new emissions data, more recent modeling studies tend to project smaller reductions in ozone from the use of methanol. Even studies using very optimistic assumptions do not show large decreases in ozone -- and, if adjustments are made to incorporate more realistic assumptions, these ozone decreases would be even smaller. A recent study by Carnegie Mellon University predicted a 9% decrease in ozone in 2000 and 6% in 2010 if all the cars in Los Angeles used neat methanol (M100). However, this estimate also assumes emission reductions from the shutdown of all refineries in the area and assumes formaldehyde emissions from methanol vehicles are one-tenth or less (3 mg/mile) than levels currently achieved by these vehicles. This 3 mg/mile level would require over 99% control of the engine-out formaldehyde levels at high mileage and is far below the 15 mg/mile CARB standard.

In addition, a recent 20 city study by Ford on the use of methanol showed clearly how ozone reductions vary from city to city depending on local conditions (VOC/NO_x ratio) -- with reductions projected for the year 2000 of up to 5.1% in peak ozone for the city with the largest ozone impact, again assuming formaldehyde was controlled to a degree not now possible. For the 20 cities, ozone reductions average only 1.3% for M85 and 2.6% for M100 if there were 100% substitution of methanol in all light duty vehicles. GM's analysis also showed the importance of local air quality conditions. GM predicted certain areas with high VOC/NO_x ratios, such as Houston, "...will not realize any ozone reduction by introducing methanol-fueled vehicles."

Further, methanol's cost-effectiveness as an ozone strategy must be assessed. This will depend on many factors, particularly in use emissions, local air quality, vehicle technology, and the price difference between methanol and gasoline. However, in most situations, the likelihood is that any air quality improvement from methanol will come only at extraordinarily high costs, typically exceeding tens or hundreds of thousands of dollars per ton of equivalent VOC removed. (As a reference, the usual norm in EPA regulatory decisions is about $2000 per ton.) A recent OTA report, which used very optimistic EPA projections of substantial VOC reductions from methanol, concluded a methanol program could cost almost $40,000 per ton of VOC removed.

A recent EPA special report on methanol paints a more optimistic picture regarding methanol's costs and benefits. However, EPA's analysis is flawed in a number of respects, including:

- EPA's cost assumptions for producing methanol in new plants from remote gas are too low. EPA does not recognize the full cost of gathering this gas, the unpredictibility of its supply and potential political instability of some areas where it is located. These factors will make it more likely that the capital costs associated with these plants will be higher as investors demand higher rates of return to compensate for such uncertainties. In addition to higher capital costs, the actual cost of the natural gas feedstock is likely to be higher than EPA suggests. EPA assumes future demand for natural gas will be low, contributing to low prices. However, natural gas prices could be higher since worldwide demand for natural gas is growing rapidly -- and would accelerate if methanol demand were to increase substantially.

- EPA's infrastructure costs underestimate the changes needed in the motor fuel infrastructure. EPA, based on limited experience with a few M100 prototype vehicles, assumes that a 30% improvement in energy efficiency is possible. Whether such gains can be achieved on production vehicles is as yet unproven. If not, EPA underestimates the amount of methanol that will be needed and therefore assumes less additional capacity will have to be added to the distribution system. Also, EPA appears to disregard the costs associated with modifications needed in the existing distribution system due to the different physical properties of methanol (for example, its solubility in water and its higher corrosivity).

- EPA calculates significant emissions reductions from methanol vehicles, but these reductions assume formaldehyde control technology which is much more effective than any demonstrated to date. Thus, EPA overstates the VOC reductions from methanol.

- EPA overestimates methanol's benefits by not comparing methanol to the best of today's gasoline vehicles. EPA's report appears to assume that future gasoline vehicles will not perform as well as some gasoline vehicles on the road today. For example, EPA certification data show that emissions for many new gasoline vehicles are already below .25 grams/mile (exhaust hydrocarbons). EPA's use of .53 - .7 grams/mile greatly overstates gasoline vehicle in-use exhaust emissions and compares with CARB's estimate of .25 grams/mile.

These are just a few of our concerns with the EPA report. This report consistently overestimates the air quality improvements associated with methanol and underestimates the costs. We urge EPA to produce full documentation for its conclusions and to subject this report to further scrutiny through peer review by an independent body, such as the National Research Council.

o A NUMBER OF SERIOUS HEALTH AND SAFETY CONCERNS MUST BE ADDRESSED BEFORE METHANOL IS USED MORE WIDELY.

The prospect of widespread distribution of methanol raises some significant health and safety issues because methanol has different properties than gasoline. While precautions can be taken to limit some of the risks, these risks must be understood more fully.

Methanol is highly toxic when ingested -- small doses can result in blindness or death. It is colorless, relatively odorless and tasteless, and burns with a nearly invisible flame -- raising concerns about detection. Methanol is completely soluble in water -- and moves easily through soil to groundwater, and thus may make drinking water contamination another concern.

Symptoms of methanol poisoning are often delayed in appearing and difficult to diagnose. Data from the American Association of Poison Control Centers on accidental methanol and gasoline exposures show that even though 75 times more gasoline is used in the U.S., there are more deaths and injuries from methanol. The 1987 fatality rate for methanol exposure was 25 times higher than gasoline despite the fact that methanol is mostly used in commercial applications with limited consumer access. An evaluation should be made of the ability of dyes, odorants and antisiphoning devices to reduce the potential for accidental exposure.

Further, methanol can be readily absorbed through the skin and methanol/gasoline mixtures appear to penetrate the skin even faster. Thus, poisoning could result from misuse as a solvent or cleaner or from spilling methanol on clothing while refueling.

Although methanol's acute toxicity is well known, there is little information about the effect of long-term chronic exposure to methanol. Also, the potential for higher concentrations of formaldehyde -- a probable human carcinogen -- in enclosed spaces such as tunnels and parking garages as a result of methanol vehicle emissions must be further explored. And, specific individuals, such as pregnant women, may be at special risk because of the way methanol metabolizes in the body.

o INCREASED METHANOL USE WILL NOT ENHANCE U.S. ENERGY SECURITY.

If a large-scale methanol program were implemented, many new methanol plants would have to be built. Most, if not all, plants would be built overseas since foreign natural gas is expected to remain the most available and lowest cost feedstock. More than three-quarters of the world's surplus exportable natural gas is located in the USSR and OPEC nations, particularly the Middle East. Excluding the USSR, over 80% of this surplus gas is in OPEC nations. Use of methanol made from natural gas may diversify the types of energy used, but would do little to reduce import dependence.

Not only would U.S. dependence on foreign energy sources escalate, but the U.S. would become more dependent on imports of a finished product with little domestic manufacturing capacity. In addition to raising energy security concerns, this would worsen the trade deficit.

o INCREASED METHANOL USE WILL REQUIRE SIGNIFICANT CHANGES IN THE EXISTING MOTOR FUEL DISTRIBUTION SYSTEM.

Methanol's lower energy content will require a substantial and costly expansion of the motor fuel distribution and storage system. Each gallon of methanol only provides about half the energy of gasoline. Therefore, widespread use of methanol will require greater capacity in the motor fuel distribution system. More tankers, barges, trucks and railroad cars would be needed to move methanol and more storage tanks at both terminals and service stations would be needed. If methanol were to be shipped by pipeline, pipelines would have to be enlarged or new ones built.

In addition, methanol's physical properties will require significant modifications to the existing distribution and storage system. Since, unlike gasoline, methanol readily dissolves in water, the entire distribution and storage system would have to be made water-free.

Some way would have to be found to address the water contamination problem in pipelines and storage tanks. Further, methanol is highly corrosive. Thus, valves and seals for pipelines and pumping stations may have to be replaced as well as some service station storage and dispensing systems which are not compatible with methanol. Since methanol is considered a hazardous substance under RCRA, costly secondary containment would probably have to be provided for underground storage systems at service stations selling methanol.

CNG and LPG

Although CNG and LPG are used in commercial vehicles throughout the world, I have concentrated primarily on reformulated gasoline and methanol in this statement. CNG and LPG also have potential to improve air quality, but their use is more likely to be limited to a particular market, such as centrally-fueled fleets.

Although more emissions data are needed, particularly to evaluate their NO_x emissions, CNG and LPG can reduce hydrocarbon emissions without the large formaldehyde emissions associated with methanol. In addition, CNG and LPG do not present the toxicity problems of methanol nor do they have methanol's cold weather starting problems. And, although additional equipment (pumps and compressor stations) would be needed, CNG and LPG can build on an existing distribution system.

Nevertheless, there are some concerns regarding these fuels. Customer acceptance of these fuels may not be forthcoming due to questions about vehicle range, refueling convenience, additional vehicle weight, restrictions on cargo space and safety concerns. Although all of these factors can be addressed, lack of customer acceptance may limit widespread use of these fuels. Therefore, centrally-fueled fleets may present the greatest opportunity at present for using these fuels.

LEGISLATIVE PROPOSALS

To ensure that a level playing field is established for all fuels, there are several basic principles that must be incorporated in any legislation concerning alternative fuel vehicles:

- Adequate time must be provided to evaluate all of the most promising fuel/vehicle combinations;

- Precise criteria, which do not discriminate between fuels should be established and a formal rulemaking and hearing process should be followed to ensure participation by interested parties in the development of any alternative fuel/vehicle program;

- The Departments of Energy and Transportation should be full partners with EPA to ensure that other major concerns such as energy security, vehicle performance and safety and cost considerations are addressed; and

- All competitors who manufacture vehicles or market or supply fuels should be treated equally.

None of these principles were reflected in the mandatory alternative fuels program proposed by the President. In particular, this program did not consider reformulated gasoline on an equal basis with other alternative fuels and left almost unlimited discretion to EPA in setting standards for alternative fuels. EPA's predisposition toward methanol, as reflected in statements by EPA officials, the SIP guidance document and EPA's special report on methanol, raises questions whether other fuels would be allowed to fully and fairly compete.

In contrast, S. 1630 appropriately avoids a mandatory alternative fuels program. However, in the debate in committee, several members expressed interest in an alternative fuels program as a means of avoiding the second phase of tighter tailpipe standards (.125 gpm). Therefore, I would like to comment on several proposals that may receive some discussion.

First, consideration may be given to requiring certain large retail outlets to offer a very specific type of reformulated gasoline. As noted earlier, we have serious concerns about such an approach. It presumes that there is one optimal type of reformulated gasoline and that we can determine now what it is. This is not the case. Fuel specifications alone ignore the critical importance of the fuel/vehicle system in controlling emissions created during the combustion process. The specifications under consideration seem to be derived from a fuel designed solely to replace leaded gasoline in the very oldest cars. Therefore, they may not be the most appropriate model for all vehicles. Further, refiners may not be able, with existing equipment, to produce the necessary volumes of this fuel if it had to be offered nationwide. And, requiring only certain outlets to offer the fuel will create competitive disadvantages among retailers as reformulated gasoline could be more expensive.

One of the main objectives of the joint auto/oil research program is to investigate which changes in the fuel and modifications to the vehicle can together produce the most cost-effective emission reductions. The results of this research should not be prejudged and a rigid formula for reformulated gasoline should not be included in the legislation.

Second, we understand that some are considering an alternative fuels program as a possible amendment to S. 1630. Since we have not seen legislative language, we can only offer general comments about this proposal. The Administration's alternative fuels program was designed to provide the incremental emission reductions needed to bring the 9 most serious ozone nonattainment areas into compliance after all credits were given for all other mobile source reductions. Before adoption of any alternative fuels program, we urge that an analysis be made of the other emission reductions required by the bill. If the other measures already are sufficient to reach attainment, then there would be no purpose to an alternative fuels program.

However, if an alternative fuels program is developed, performance standards for fuel/vehicle systems should be set to allow all fuels and vehicles which can meet it to compete in the market. Vehicle manufacturers and fuel suppliers should be given maximum flexibility to determine how best to meet this standard. In addition, fuels that reduce emissions from existing vehicles should receive credits for those reductions under this program.

S. 1630 also contains provisions (Section 217) which require that EPA promulgate regulations establishing specifications for fuel quality. We believe that this provision is unwarranted based on existing Section 211 of the Clean Air Act giving EPA authority to regulate fuels.

Finally, I would like to close by addressing a particularly onerous provision of S. 1630, -- the 3.1% minimum oxygen content requirement. S. 1630 requires the use of oxygenated fuels in all CO nonattainment areas, setting a minimum oxygen content of 3.1%. We strongly oppose this provision because it is essentially an ethanol mandate, despite the oxygen credit trading program established in the bill. Such a requirement will reduce consumers' fuel choices and will not be a cost-effective CO reduction strategy.

The carbon monoxide problem is diminishing as newer cars with advanced emission and engine controls replace older, higher polluting cars. Between 1978 and 1987, EPA estimated that CO emissions were reduced by 32%. During that same period, the CO contribution from highway vehicles decreased by 38%, despite a 24% increase in vehicle miles traveled. Data from EPA indicate that the number of CO nonattainment areas continues to decline. Most CO nonattainment areas are likely to reach attainment in the near term without imposing an oxygenated fuel program.

Further, programs already have been developed in many of those CO nonattainment areas which could benefit in the short-term from the use of oxygenated blends. A federally-imposed program will restrict the flexibility of state and local governments to design the most cost-effective programs for their areas. Instead, those areas should simply be directed to develop programs specifically tailored to their own local conditions -- programs which would retain a choice of fuels for consumers.

While oxygenated fuels can reduce CO emissions in older cars (pre-1981), most of the CO reduction can be achieved at a 2% oxygen level. And, the 2% level would allow other oxygenates such as MTBE, and ETBE, to compete in the marketplace.

Since under current EPA regulations ETBE can only be blended up to 2% and MTBE up to 2.7% oxygen by weight, the 3.1% oxygen requirement in S. 1630 is, in fact, an ethanol mandate. Even the trading provisions cannot alter the fact that unsubsidized oxygenates like MTBE must compete with a heavily subsidized oxygenate like ethanol. Ethanol producers receive the equivalent of a 60 cents per gallon subsidy by virtue of their exemption from 6 of the 9 cents per gallon federal excise tax on gasoline. (Every dollar of this subsidy is funding lost for the Highway Trust Fund -- if ethanol use increases as a result of this mandate, the Highway Trust Fund will lose even more than the $480 million it now loses annually as a result of this subsidy). And, this is compounded by additional state subsidies.

Since ethanol is the only fuel in widespread commerce with an oxygen content above the 3.1% requirement, under S. 1630, ethanol producers would receive yet another subsidy through revenues from the sale of oxygen credits. The cost of purchasing these credits will further disadvantage the use of MTBE and ETBE. In addition, given the number of retail outlets involved, such a trading program will be difficult and costly to enforce, making the crude oil entitlements program seem simple in comparison.

Further, the number and complexity of the tests that would be required make this proposed program far different from the lead phasedown program. There is no simple and cost-effective means of testing oxygen content at the retail level. Testing at the refinery or terminal will not suffice. Alcohol blends are typically splash-blended near the retail level since these blends cannot be shipped through existing pipelines without major new investments in dehydration equipment to prevent the alcohol from separating from the gasoline in the presence of water.

SUMMARY

Further research is needed to answer the many unresolved questions concerning alternative fuels. However, it is clear that the mandatory alternative fuels program proposed by the Administration is unlikely to be an environmentally effective or cost-effective ozone reduction strategy, particularly if methanol fuels are favored. A complete evaluation of the cost-effectiveness of various ozone reduction strategies is necessary.

The joint auto/oil research program will yield important and timely data. We believe reformulated gasoline (combined with further vehicle modifications to take full advantage of it) could well result in significant emission reductions. While we continue to question the need for an alternative fuels program such as that proposed by the Administration, if any program is considered we believe that it should set performance standards rather than select a given fuel and that a level playing field must be provided for all fuels.

Federal oxygenated blend mandates (such as that in S. 1630) are unnecessary and will not prove to be a cost-effective carbon monoxide reduction strategy. Instead, flexibility should be retained for state and local governments to design programs best suited to their individual needs.

WRITTEN STATEMENT OF
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OF COLUMBUS, OHIO
ON BEHALF OF
THE AMERICAN GAS ASSOCIATION
AND THE
NATURAL GAS VEHICLE COALITION
BEFORE THE
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS
UNITED STATES SENATE
ON THE USE OF ALTERNATIVE VEHICLE FUELS

JANUARY 11, 1990

January 11, 1990

AMERICAN GAS ASSOCIATION AND
NATURAL GAS VEHICLE COALITION
FLEET VEHICLE PROPOSAL

The natural gas industry's primary concern in regard to the mobile source provisions of the Clean Air Act amendments is to ensure that a strong provision regarding centrally refueled fleet vehicles is included. Our support for a broader program to cover passenger vehicles as well would depend on the extent to which it includes a fleet program that contains the elements listed below.

A fleet program is justified because fleet vehicles travel two-and-a-half times the mileage of passenger vehicles per year. 180,000 fleet vehicles operating on natural gas can achieve the same emissions reductions as can be achieved from one million general passenger vehicles running on a fuel that would achieve 30% reductions in ozone producing hydrocarbons, as envisioned to occur under the Administration's original clean air legislation. (We understand EPA to have estimated such a 30% reduction level for M-85.)* A fleet program is feasible to implement because the vehicles are centrally refueled and the fleets purchase large numbers of vehicles every year. Such centrally refueled fleets are present in the right places: all serious, severe, and extreme nonattainment areas.

The elements identified below should be included in such a fleet program:

1. No one alternative fuel should be used as an emission standard.

2. Clean alternative fuels include natural gas, liquefied petroleum gas, methanol (including a mixture containing 85 percent methanol by volume), ethanol, reformulated gasoline, electricity or any other motor vehicle fuel or power source if such fuel or power source has comparable low emissions.

3. Public and private fleet vehicles would be required to attain emission reductions for ozone producing hydrocarbons and air toxics. (Ozone producing hydrocarbons include tailpipe, evaporative, running loss, and refueling emissions.)

4. Emissions reductions should be achieved on a per vehicle basis for each vehicle subject to fleet requirements pursuant to a two-phase approach.

   - Phase I would require 30% and 40% percent reductions of ozone-producing hydrocarbons and air toxics, respectively, in 1995;
   - Phase II would require 80% and 90% reductions, respectively, in 2000;
   - The baseline from which emissions are measured would be the emissions standards that apply to a new model year 1994 vehicle that runs on today's conventional gasoline or diesel fuel.

5. For private fleets, all new covered fleet vehicles shall be clean-fuel vehicles and operate on a clean alternative fuel when in the nonattainment area. This requirement would be phased in. An appropriate schedule should be at least 30 percent of new vehicles in 1995, at least 50 percent in 1996, and at least 70 percent in 1998.

*See A.G.A. Issue Brief Document #1990-3.

6. For federal, state, and local government fleets, significant percentages of all vehicles in the fleets shall be clean-fuel vehicles and operate on clean alternative fuels when in the nonattainment area. As with private fleets, this requirement should be phased in, and an appropriate schedule would be at least 30 percent of all vehicles in 1995, at least 50 percent in 1996, and at least 90 percent in 1998.

7. The fleet program will apply to all classes of fleet vehicles.

8. The fleet program shall apply to fleet vehicles that operate primarily in serious, severe, or extreme ozone nonattainment areas.

9. A government fleet may obtain a waiver from the program if it does not have available to it, or could not reasonably be expected to establish, a central refueling station, unless clean alternative fuels are widely available at retail fuel outlets within the area.

10. Waivers for private fleets should be granted by EPA upon a showing that a clean-fuel vehicle suitable to the covered fleet operator's unique purposes is not available from a vehicle manufacturer.

11. Fleet operators should have the discretion to choose the clean-fuel vehicles and clean alternative fuel(s) that they will place in service.

12. A governor may issue credits for clean-fuel vehicles that achieve greater emissions than required by the fleet program. The credits may be traded or sold within the nonattainment area or used to reduce the number of clean-fuel vehicles that a covered fleet operator is required to place in service.

13. Conversions of existing gasoline or diesel-powered vehicles to operate on a clean alternative fuel and which achieve at least the required emissions reductions shall be included in the fleet program. EPA shall promulgate standards concerning the conversions of vehicles.

14. The provisions applicable to private and government fleets shall not apply to retail rental fleets, automobile dealer fleets, law enforcement vehicles, emergency vehicles, or military vehicles.

15. Automobile manufacturers will be required to certify that they have the capacity to manufacture, produce, and distribute the clean-fuel vehicles required by this program.

16. Under a separate program, buses should be required in certain urban areas to run on clean alternative fuels.

INTRODUCTION

The American Gas Association (A.G.A.) is a national trade association composed of some 250 natural gas distribution and transmission companies serving over 166 million natural gas consumers throughout the United States.

The Natural Gas Vehicle (NGV) Coalition is made up of nearly 100 members, including natural gas distribution companies, pipelines, producers, automotive equipment and vehicle manufacturers, natural gas vehicle users, environmental organizations, educational institutions and other organizations interested in commercializing natural gas as a vehicle fuel. The NGV Coalition is dedicated to promoting and stimulating the development of a healthy natural gas industry.

A.G.A. and the NGV Coalition appreciate the opportunity to comment on the development of an alternative fuels vehicle program. Our recommendations as to how a fleet program for alternative fuel vehicles should be structured have been detailed above. A program such as the one described would achieve significant emissions reductions through a practical, workable program. We recommend that S. 1630 be amended to include such a fleet vehicle program.

The Alternative Motor Fuels Act of 1988 was an important step toward providing manufacturers with an incentive that will serve the purpose of stimulating demand for such vehicles. We believe this law provides an important foundation on which to improve air quality by promoting the expanded use of NGVs and other alternative fuel vehicles. NGVs can deliver important benefits to the American people, and we have the gas supplies to fuel those vehicles. As mandates and incentives are initiated at both the state and federal levels, NGVs should be enabled to compete with other alternative-fuel vehicles fairly in serving the transportation needs of our country with a balanced fuel mix.

In August of 1988, the Department of Energy released "Progress Report Two: The International Experience" as the second volume of its multi-volume study, Assessment of Costs and Benefits of Flexible and Alternative Fuel Use in the U.S. Transportation Sector.

This DOE study surveyed the actual experience with alternative-fuel vehicles in several different countries that are pioneers in the field.

The DOE study shows that, of all the alternative-fuel vehicles being used throughout the world, more than half are running on gaseous energy.

Our statement will show that this is no accident. Natural gas vehicles offer a wide range of benefits for their customers and for the public in general. It is no wonder they are popular.

Natural gas vehicles can be popular in this country, too -- _if_ public policy decision-makers will include them in air quality planning _and_ permit them to compete on their own merits against other alternative-fuel vehicles.

AIR QUALITY BENEFITS OF NATURAL GAS VEHICLES (NGVs)

EPA Estimates of Emission Reductions From NGVs

On January 28, 1988, the Environmental Protection Agency issued a Technical Guidance Document, suitable for use by state and local governments in estimating the actual impact of various air quality improvement options. The document, entitled _Technical Report: Guidance on Estimating Motor Vehicle Emissions From the Use of Alternative Fuels and Fuel Blends_, estimates that NGVs can yield the following emission reductions:

A 50% reduction in tailpipe emissions of carbon monoxide

A 40% reduction in tailpipe emissions of reactive hydrocarbons

A _100%_ reduction in emissions of reactive hydrocarbons from filling stations and evaporation

We note that EPA views its estimates as advisory rather than mandatory. That is, EPA permits states and localities to use their own estimates, in place of EPA estimates, where states and localities can show it is reasonable to do so. This point is particularly important because, in the gas industry's view, EPA has been conservative in estimating the achievable emission reductions from shifts to NGVs.

Estimates of Emission Reductions From NGVs

A.G.A. and the NGV Coalition regard EPA's estimates as conservative. Our estimates, based on gas industry experience, show that even more dramatic reductions are achievable for carbon monoxide and reactive hydrocarbons. As compared to gasoline vehicles, natural gas vehicles offer major reductions in emissions of carbon monoxide and reactive hydrocarbons.

So far, nearly all natural gas vehicles on the road are conversions of existing vehicles that once relied solely on gasoline or diesel fuel. Our experience with such vehicles indicates that, when proper procedures are used to convert older gasoline or diesel fuel vehicles to natural gas, such conversions can reduce emissions of carbon monoxide and reactive hydrocarbons by more than 80 percent.

The actual emission reductions achieved depend on a large number of factors, including the tuning of both engines, the age and design of both vehicles and the condition and technology of the gasoline emission controls and the natural gas conversion equipment. Despite these possible variations, however, the emission reductions will be significant so long as proper procedures and equipment are employed.

Even compared to vehicles that employ new gasoline technology, NGVs can achieve significant reductions of emissions. A.G.A. estimates that carbon monoxide could be reduced by up to 82 percent and reactive hydrocarbons could be reduced by up to 87 percent even in the case of new vehicles that have suffered no degradation from exposure to road conditions.

Because new gasoline vehicles have made substantial headway in reducing gasoline-related nitrogen-oxide, out performing gasoline on this pollutant, with respect to such vehicles, is a difficult challenge. However, it appears that newly manufactured engines that are designed from the start for natural gas can be engineered to reduce nitrogen oxide emissions substantially.

In a study recently prepared for A.G.A.,[*/] Professor E. J. Durbin of Princeton University concludes that an engine designed to run on natural gas could achieve reductions of nitrogen oxides by virtue of the leaner air/fuel mixtures that would be possible with such an engine. These emissions reductions could be achieved without the use of a catalytic convertor, thereby maintaining low emission levels that could not be maintained over time by a catalytic convertor. The efficiency of a catalytic convertor decreases rapidly with time as the catalyst becomes poisoned with exhaust products.

A list of Professor Durbin's key conclusions on fueling vehicles with natural gas is as follows:

1. This study has shown that from both emissions and efficiency points of view, gaseous fuels, and in particular natural gas fuels, are superior to gasoline in vehicular applications. The engine designer would prefer natural gas as a fuel over any other fuel.
2. Principal advantages of natural gas fuels come from the ability to more readily create homogeneous mixtures of air and fuel, which permits the use of lean combustible mixtures, and from the low carbon hydrogen ratio of fuel molecules.
3. Most assessments of emissions with natural gas fuels are based on fuel systems that have not been optimized for natural gas. These systems do not exploit the full advantages of natural gas fuels.

[*/] Durbin, E. J., Understanding Emissions Levels from Vehicle Engines Fueled with Gaseous Fuels; Princeton, N.J., Princeton University, February 1989.

4. In an engine "designed for natural gas" it should be possible to achieve oxides of nitrogen emissions much lower than those emissions from gasoline engines.
5. These low emissions should be attainable without catalytic convertors to clean up the engine exhaust.
6. Total hydrocarbons can be reduced 33 to 50 percent when using gaseous fuels. When the gaseous fuel is natural gas, environmentally active hydrocarbons can be reduced 90% as compared with gasoline.
7. With lean mixture control systems, carbon monoxide can be effectively eliminated from the exhaust of natural gas fueled engines.
8. Carbon dioxide emissions are reduced approximately one third as compared with gasoline.
9. An essential element in achieving these results, with good driveability, is a control system which adjusts air/fuel ratio to fit power requirements. Such a control system, coincidentally, provides increased fuel economy.

Professor Durbin estimates that, in optimized, factory-built NGVs, reductions of both reactive hydrocarbons and CO emissions of over 90 percent can be attained. Such vehicles could also achieve NO_x emissions reductions of 30 percent. Of course, while newly manufactured NGVs can be expected to outperform retrofitted NGVs in emission levels and other respects, retrofitted NGVs represent a "bridge" between current circumstances and consumer acceptance of dedicated, factory-built NGVs.

After this discussion, it may be useful to summarize our emission reduction estimates in capsule form. Table I summarizes the emission reduction estimates for retrofitted vehicles.

TABLE I

A.G.A. ESTIMATES OF ACHIEVABLE EMISSION REDUCTIONS PER VEHICLE WHEN GASOLINE VEHICLES ARE RETROFITTED TO NATURAL GAS*

Pollutant	Vehicles Using Older Gasoline Technology	Vehicles Using NEW Gasoline Technology
CARBON MONOXIDE	-99%	-82%
REACTIVE HYDROCARBONS	-92%	-87%

* Assumes use of proper procedures and equipment.

Use of Natural Gas in Heavy Duty Engines

Newly manufactured heavy duty trucks and buses must soon meet tightened EPA standards for heavy duty engines. Newly manufactured natural gas engines are an extremely attractive compliance option.

In 1988, newly manufactured natural gas buses, leased to the City of New York by Brooklyn Union Gas Company, were tested by EPA at the EPA facilities in Ann Arbor, Michigan. The results of these tests show that emissions from the buses met, or far surpassed, the EPA standards for model year 1991 gasoline-fueled heavy-duty engines.

For carbon monoxide, emissions were 10.6 grams per brake horsepower-hour (g/b-hp/hr), compared to a standard of

14.4.

For nitrogen oxide, emissions were 1.4 g/b-hp/hr, compared to a standard of 5.0.

For reactive hydrocarbons, which were only about 15% of the total hydrocarbons emitted, the bus emissions were extremely low. Even for total hydrocarbons, most of which do not appear to react chemically in the lower atmosphere, the bus emissions were 1.2 g/b-hp/hr. The standard is 1.3.

Greenhouse Effect Considerations

Given the rising interest in possible global warming consequences from an apparent Greenhouse Effect, any environmental policies should take into account the estimated direct and indirect carbon dioxide emissions from vehicular combustion of natural gas, gasoline, gas-derived methanol, coal-derived methanol and other fuels.

Carbon dioxide is thought to be the leading actor in the greenhouse effect. With this concern in mind, we bring to your attention a recent Congressional Research Service Report for Congress entitled Carbon Dioxide Emissions From Methanol as a Vehicular Fuel. This Congressional Research Service report provides somewhat different numbers from those provided in an earlier World Resource Institute study. However, both studies agree on two key points: (1) use of coal-derived methanol in vehicles will substantially increase carbon dioxide emissions; and (2) direct combustion of natural gas in vehicles will substantially decrease such emissions.

The report estimates that, in comparison to gasoline, direct combustion of natural gas in vehicles will reduce carbon dioxide emissions by 30% or more.

Natural gas vehicles do emit some unburned methane. In fact, unburned methane accounts for most of the non-reactive hydrocarbons emitted by NGVs. As the term "non-reactive hydrocarbon" suggests, unburned methane is not a chemically interactive gas and does not contribute to smog formation. A.G.A. and the NGV Coalition are aware of speculation that unburned methane from natural gas vehicle tailpipes, while not chemically reactive in the lower atmosphere, may nevertheless pose environmental problems in the upper atmosphere because methane is a "Greenhouse gas". The Congressional Research Service has concluded that methane emissions from NGVs would be so minuscule that even if every vehicle in the world were to run on natural gas, the total additional emissions of methane would add only about 5% to the current methane emissions from all sources.* In fact, we believe, given our research on the issue, that NGVs reduce total vehicular greenhouse impacts by at least 25 percent even when considering methane emissions.

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* Gushee, David E., "Alternative Fuels for Motor Vehicles, Some Environmental Issues," (Washington, D.C.: Congressional Research Service, 1988), pp. 17-18.

State Actions

In recognition of the air quality improvements that NGVs or other alternative fuel vehicles can make, states such as Texas, Arizona, and California have adopted measures to promote these vehicles. The most recent example of ambitious state action in this regard occurred in California, where the Governor signed legislation last September that mandates that at least 25 percent of new state vehicles must run on clean alternative fuels and that the state sales tax will not be imposed on the incremental cost of clean-fuel vehicles.

In Texas, the state legislature passed a bill on May 29, 1989 to promote NGVs and other clean vehicles. The Texas legislation requires phased-in vehicle conversions to NGVs or other clean vehicles starting in 1991. State-owned or operated fleets with more than 15 vehicles, school districts with more than 50 buses, and local transit authorities must convert their fleets to NGVs starting in 1991 and finishing in 1998. The legislation anticipates private financing for the vehicle conversions but allows for waivers in instances where reasonable financing is unavailable.

ECONOMIC BENEFITS OF NGVs

In addition to the obvious environmental benefits of natural gas, it may also be the most economical of all alternative fuels currently available. The cost of fueling a vehicle with natural gas is currently estimated to be about 30%-60% of the cost of fueling a vehicle with gasoline, including the additional cost of compressing the natural gas. The price per gallon equivalent of natural gas currently ranges from 40 to 75 cents. While the pump price of natural gas varies from region to region, much like gasoline, the typical sale price of natural gas averages approximately 62 cents per equivalent gallon. Furthermore, it should be pointed out that several gas companies, including A.G.A. and NGV Coalition member Pacific Gas and Electric Company, are developing a low pressure natural gas storage system which will significantly lower the overall cost of natural gas as a vehicle fuel by obviating the need for compression.

In addition to natural gas' lower pump price, and because of its clean burning qualities, natural gas offers significant savings in vehicle maintenance costs. Practical, on-road experience with natural gas vehicles shows that standard maintenance is half that of gasoline powered vehicles. Many users report that oil changes need not occur more than every 10-20,000 miles, and spark plugs, in some vehicles.

SAFETY

Unlike many other alternative fuels currently under development, natural gas has a long and rich history as a vehicle fuel dating back to the infancy of the automobile itself. There are currently over 500,000 natural gas fueled vehicles worldwide, including over 30,000 in the United States. The lesson we have learned from this long history and extensive use is that natural gas may be the safest vehicle fuel of any type currently available, including gasoline.

A recent A.G.A. survey of natural gas vehicle fleet operators revealed that in over 434.1 million miles driven by the sample fleet, injury rates per vehicle mile traveled were 84% less than the national average for injuries per vehicle mile traveled for all U.S. registered vehicles.

In addition, the unique properties of natural gas itself make it extremely safe for use as a vehicle fuel. Unlike other alternative fuels, natural gas is neither corrosive nor toxic. Natural gas is lighter than air. Therefore, in the unlikely event of a leak, natural gas will safely dissipate into the air. Gasoline, and some other liquid alternative fuels, form dangerous puddles and pools on the ground in the event of a leak. Moreover, natural gas' ignition point is two times higher than that of gasoline, only igniting at a temperature of between 1200 to 1300 degrees, and only within a very narrow gas-to-oxygen mixture range of 5 to 15 percent.

Finally, the fuel tank cylinders for natural gas vehicles may be the safest and most extensively tested vehicle fuel storage system available. They are typically made of reinforced aluminum or three-quarter-inch-thick steel and have been subjected to severe abuse testing. Natural gas cylinders have successfully withstood blasting with dynamite, freezing, bonfires, and bullets, all without bursting or causing fire. None of the other alternative fuels, with the exception of, perhaps, propane, can make this claim.

NATIONAL SECURITY BENEFITS OF NGVs

America's reliance on imported oil is on the rise again. At this point, foreign sources meet approximately 50% of the oil we consume every year -- and many of these foreign supplies come from OPEC countries. The need for transportation fuel plays a key role in our nation's inability to break free.

Since the internal combustion engine was invented, oil has held a virtual monopoly in the transportation fuels market. In every other major energy use market -- from chemicals to powerplants -- substitutes for oil are readily available and can be mobilized for use in the event of available and can be mobilized for use in the event of another disruption of imported oil supplies. In transportation, however, oil still reigns supreme.

To grasp the extent and implications of this oil dominance, consider the fact that transportation absorbs two-thirds of all the oil we use in America. If tomorrow we stopped using oil for everything else -- for heating homes, for making chemicals, for generating power -- we would still have to import oil just to feed our transportation sector.

Clearly, America will not be able fully to end its vulnerability to imported oil disruptions until America introduces competition in the transportation fuel markets.

Natural gas also has the benefit of a delivery system of over one million miles of existing pipeline. Through this pipeline network, natural gas can be brought to virtually any part of the nation for vehicular transportation.

With respect to increased reliance on a domestic energy source, natural gas use in the transportation sector can displace a significant amount of imported oil. A recent study, Natural Gas: A Strategic Resource for the Future,* estimated natural gas used in the transportation sector could achieve sales of up to 1.7 Tcf annually by the year

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*infra, p. 26.

2010 (based on assumptions that gas would be used in five percent of the nation's private vehicles, 25 percent of the private fleets, and 75 percent of urban mass transit buses).

Using 1.7 Tcf of gas annually in vehicles would displace approximately .85 million barrels per day (mbpd) of crude oil. Assuming current crude oil imports of about 50 percent of consumption, this means that approximately .425 mbpd of imported crude oil would be displaced.

Since current imports of crude oil are approximately 8 mbpd, the .425 mbpd displacement would represent about five percent of crude oil imports. It would also represent about 2.5 percent of total consumption.

The increased reliance on a domestic energy source would also improve the nation's current trade imbalance. At $15 per barrel, displacing .425 mbpd would save approximately $2.3 billion per year in payments to foreign sources. At $20 per barrel, the savings -- and reduction in our trade deficit -- would be approximately $3.1 billion annually.

AVAILABILITY OF NGV TECHNOLOGY

There may be some concern about the availability or reliability of current natural gas vehicle technology. However, there is a long and rich empirical history of the use of natural gas as a vehicle fuel. Of the 500,000 natural gas vehicles operating worldwide, Italy has almost

300,000 such vehicles on the road today. Other countries, such as Canada, New Zealand, and China have extensive experience with natural gas as a vehicle fuel and large operating fleets of such vehicles. The Soviet Union has recently announced its plan to convert one million of its vehicles to clean burning natural gas. In the U.S., we currently have approximately 30,000 natural gas vehicles on the road and operating today. These vehicles range from heavy duty buses, trucks, and delivery vans to personal family cars. While there is currently a high degree of reliability and safety associated with natural gas vehicle technology, the natural gas vehicle industry is continuing to develop and improve its equipment.

For example, the Ford Motor Company built 27 Ford Ranger pickup trucks which were designed and built from the ground up to run on natural gas. GSM Taxi is currently producing a line of long-life vehicles suitable for use as taxis or work vans that are designed to run exclusively on natural gas. Brooklyn Union has already purchased 12 of these vehicles for use as service vans in its fleet. Brooklyn Union is presently testing them on the streets of Brooklyn to assess their potential for use in the New York City market as service vans or as long-life taxis, something that New York, or many other cities for that matter, could desperately use.

For general vehicle use, there is currently a highly developed state of the art engine technology for light duty applications on vehicles weighing less than 8,000 pounds. Conversion (retrofit) equipment is the most common application for both carbureted and fuel injection engines. The various types of equipment now on the market allow the conversion of existing engines either to run exclusively on natural gas or to be dual fuel capable, which allows the driver to run on either natural gas or gasoline.

The conversion equipment for carbureted engines can be installed on any gasoline engine currently on the market. Conversion equipment for fuel injected engines is also available and in fact, because of the more efficient mixing of fuel and air, fuel injection conversions are preferable.

There is also an extensive amount of work being performed in the design and development of engines dedicated to run exclusively on natural gas. Ford and GSM both have installed dedicated natural gas engines in their natural gas vehicles.

The development of heavy duty engine technology for vehicles weighing more than 8,000 pounds has also received a great deal of attention recently. Retrofit equipment for diesel engines is available that allows diesel engines to run on a mixture of approximately 80% diesel and 20% natural gas. This mixture virtually eliminates the heavy particulate emissions produced by heavy duty diesel engines, as well as substantially reducing other harmful emissions. Southwest Gas Corporation has assisted the City of Phoenix, Arizona in retrofitting one of its transit buses with such a kit, and that bus is currently in operation in that city.

Diesel engines dedicated to running exclusively on natural gas are also currently under development. Such dedicated diesel engines may be the accepted standard for heavy duty engines in the near future as they will allow heavy duty diesel engines to meet the EPA's upcoming diesel emission standards. The Gas Research Institute has allocated a total of $11 million through 1992 to developing this and other natural gas vehicle technology. Cummins Engine Company has joined forces with the Gas Research Institute to develop a low emission heavy duty natural gas engine and has delivered the first of these engines. Also, Hercules Engine has announced its plan to deliver a dedicated natural gas diesel engine to market this year. Southwest Research Institute is developing conversion equipment which will allow existing diesel engines to be converted to run on natural gas.

The successful potential of heavy duty natural gas engine technology is being tested in Los Angeles. The Los Angeles Transportation Commission has a program which will involve the purchase of ten transit buses dedicated to running exclusively on natural gas. The program also involves the conversion of two diesel buses to run on a mixture of diesel and natural gas. Southwest Research Institute is performing the conversion with funding from Southern California Gas Company.

Brooklyn Union Gas Company is currently testing two natural gas buses in daily service in New York City. The buses were manufactured by Bus Industries of America using GM 454 engines that were converted to run exclusively on natural gas. As noted previously, the buses have been through extensive emission testing by the EPA at its testing lab in Ann Arbor, Michigan and have achieved excellent results. Furthermore, in 1988, Brooklyn Union drove one of its natural gas buses from New York City to the World Gas Conference in Washington, D.C. and back without any difficulty or problems. That trip was roughly the equivalent of a one-way drive from Los Angeles to San Francisco. In his address to the Conference, President Reagan praised our efforts in developing a clean-burning natural gas-fueled bus for use in New York City.

Columbia Gas Company has taken a similar initiative. Last September, the Columbia Gas Company christened 'Columbia' -- the nation's first bus designed and built exclusively to run on natural gas -- which appeared on Capitol Hill in conjunction with the "On the Hill with

Natural Gas" conference. Because natural gas is so clean burning, the bus has no particulate or sulphur emissions -- a white handkerchief held to the bus's tailpipe will show no evidence of soot -- and emissions of nitrogen oxide, carbon monoxide and hydrocarbons are substantially reduced compared to today's diesel buses. Columbia Gas is convinced that use of natural gas buses can mean the end to buses that spew black soot.

A.G.A. and the NGV Coalition are encouraged by the strong interest shown in the 'Columbia' by many federal, state and local officials as well as transit authorities. Like many other gas companies, Columbia Gas has converted a substantial number of vehicles to natural gas. Columbia Gas is also planning to construct three new NGV refueling stations in Columbus. These stations and an existing refueling station will be placed roughly at opposite corners of the beltway that surrounds the city. A new refueling station at the downtown headquarters of Columbia Gas Distribution Companies will make five refueling stations in Columbus. An automatic key card system will be installed at all refueling locations and public access will be provided whenever possible.

GAS SUPPLY AVAILABILITY FOR NGVs

There are clear environmental reasons to expand vehicular use of natural gas. There are no supply-related reasons to hold back.

We acknowledge that there may be infrequent, localized difficulties with gas deliverability. However, any such difficulties should be easily remedied because they are the result of either regulatory practices or operational logistics. So long as the domestic natural gas resource base remains free of price controls and other artificial market constraints, the domestic resource base -- particularly when it is coupled with supplemental North American gas sources in Canada and Mexico -- is large enough to meet substantially higher levels of gas demand. The resource base is also large enough to overcome the results of occasional marketplace misjudgments.

Recent Estimates of the Natural Gas Resource Base

A.G.A. does not stand alone in pointing to a large domestic natural gas resource base. The same conclusion has been reached by the Department of Energy (DOE).

In March of 1987, in a volume entitled Energy Security: A Report to the President of the United States, DOE told President Reagan:

> If unconventional gas supplies (such as gas shales, tight gas sands, and gas hydrates) are included in the total, the Nation's supplies of natural gas may support

200 years of consumption at current rates.

In May of 1988, DOE issued a landmark study on natural gas supplies, entitled An Assessment of the Natural Gas Resource Base of the United States. In this May 1988 study, which drew upon the knowledge of a number of expert panelists, DOE focused solely on natural gas resources that are domestically available and can be recovered with today's technology. The study found that, in the lower 48 states alone, natural gas reserves and resources total 1,059 trillion cubic feet (Tcf). At the 1987 level of nationwide gas consumption, this amount is equivalent to a 62-year supply.

Of this 62-year supply of technologically recoverable gas, the equivalent of a 35-year supply is available at wellhead prices below $3.00 per million Btus (MMBtu). This wellhead price range is not too different from prices that now occur at the peak of the winter heating season.

DOE adds that the 35-year supply can rise to a 45-year supply if wellhead prices rise to $5.00 per MMBtu. This range is far above today's prices, but still within the historical experience of gas consumers in the early 1980s. These supply figures do not include vast natural gas resources in Alaska (estimated by DOE at 129 Tcf), Canada and Mexico.

In short, DOE's estimates of the gas that is ultimately available to American consumers can be considered conservative. We add that DOE's resource base estimates are similar to the most recent estimates made by the Potential Gas Committee (PGC), a body of independent experts from throughout the natural gas industry. According to the latest PGC study, in the lower 48 states alone, conventionally recoverable gas at year-end 1988 (including "proven" reserves, which are already known to exist) was 832 Tcf. At 1987 gas consumption rates of roughly 17 Tcf per year, the PGC estimate is equivalent to a 49-year supply. Whether this Committee prefers the DOE or the PGC supply estimates, it is clear that the lower 48 States are able to produce enough natural gas to meet expanded gas demand.

An "Elastic" Resource Base

In a December 16, 1988 letter that invited A.G.A. to testify at the field hearings of the Health and Environment Subcommittee of the House Energy and Commerce Committee, Chairman Waxman asked A.G.A. this question:

> In the context of both methanol and compressed natural gas, how much of the existing motor vehicle fleet in California and nationally could be powered for how long by currently known natural gas supplies?

This question highlighted the fact that the domestic supply of natural gas is an elastic resource base. A.G.A.

responded to the question by pointing out that, for a given number of vehicles, the volumes of natural gas required to fuel the vehicles indirectly -- through conversion of the natural gas to methanol -- will be more than 50 percent greater than the volumes required to fuel the vehicles directly. This is because more than one-third of the original energy content of natural gas is typically lost during the gas-to-methanol conversion process.

Beyond this response, it is important to note that a fixed natural gas inventory does not, in fact, exist. What exists instead is an "elastic" resource base: one that expands in response to the marketplace incentives of price level and demand level.

The lesson of an "elastic" resource base has become clear to the gas industry over the last 10 years. During the 1970s, prior to the enactment of the Natural Gas Policy Act of 1978, reserve replacements as a percentage of domestic production averaged 46 percent. During the 1980-88 period the reserve replacement ratio has averaged 89 percent. During the late 1970s and early 1980s, surging wellhead prices brought forth pioneering development of frontier gas resources -- including deep gas, tight sands gas and gas from deep waters offshore. Some frontier gas volumes became accessible as a direct result of the higher wellhead prices, while other volumes became accessible as a result of new technology induced by the higher wellhead prices. In any case, America's gas "inventory" was shown to be fluid instead of fixed.

In a variation on this theme, the subsequent drop in wellhead prices also expanded the scope of potentially accessible resources. Just as higher wellhead prices developed technology and expertise for reaching deep onshore and deep offshore gas, so lower wellhead prices induced more efficient drilling practices and development of lower-cost technology for tapping more gas from conventional onshore reservoirs. Once again, the resource base was shown to be "elastic".

Thus, we cannot say "how long" the nation's gas supplies will "last" if natural gas serves as a transportation fuel on a major scale. We can report, with recent history as our guide, that the domestic resource base will tend to grow as the nation's need to rely on it grows.

An Important New Study of Future Gas Supply and Demand

It is also reassuring to know that a November 1988 report, prepared by two former high-ranking DOE officials, concludes that the nation could increase its natural gas consumption by a substantial amount without triggering any disruptive distortions of the energy marketplace.

The study in question, issued by Washington Policy and Analysis, is entitled Natural Gas: A Strategic Resource For the Future. The two authors are William Martin and Scott Campbell, both of whom served as high-level DOE officials in the Reagan Administration.

One major focus of the study is possible changes in overall gas supply and demand between 1987 and 2010.

Among other findings, the study concludes that, under an appropriate mix of low-cost public policy initiatives that are consciously designed to foster the increased use of natural gas, nationwide gas consumption could rise from the 1987 level of 17.1 Tcf to a new level of 24.1 Tcf in 2010. The study indicates that this major increase could occur without causing significant marketplace distortions, and the study explicitly addresses the question of how the necessary gas supplies can be obtained.

Apart from its substantive findings, the study is also historically significant for its methodology. The study is likely to represent a milestone in energy modeling because it provides the first independent analysis of the implications resulting from end-use technology developments and recent work in the area of gas resource base estimates.

POSSIBLE IMPACT OF NGVs ON OVERALL GAS DEMAND

We have attempted to develop, for the Committee's information, some estimate of how large-scale use of NGVs might affect gas demand.

Our task has been complicated by the fact that America has placed on the road a great mix of vehicles, with a great diversity in fuel consumption patterns that reflects differences in engine type as well as major jumps in energy efficiency as we move from one "vehicle vintage" to another.

Table II indicates the diverse range of possible gas demand per vehicle, just among light duty vehicles.

TABLE II
ESTIMATED NATURAL GAS DEMAND PER VEHICLE PER YEAR*
In thousands of cubic feet (Mcf)

Type of Vehicle	Estimated Annual Gas Demand*
Old "Vintage" Passenger Car	100
Brand New Passenger Car	50
Average for All Passenger Cars, Old and New, On the Road in 1985	64**
Average for ALL LIGHT DUTY VEHICLES, Old and New, Including Light Duty Trucks, On the Road in 1985	76**

* Assumes exclusive use of natural gas.
** Derived from U.S. Department of Transportation data.

We estimate that if eight to ten million vehicles in the United States were converted to natural gas, they would only use approximately one trillion cubic feet of gas, or roughly six percent of our total annual consumption.

Since newly acquired buses must soon meet EPA's 1991 emission standards for heavy duty engines, we have prepared an estimate of fuel consumption by natural gas buses. While we do not have a specific number for municipal buses, we do have a Department of Transportation number for fuel consumption by commercial buses in general, including intercity buses. Using this number as a starting point, we can offer a "ballpark" estimate that the average municipal bus, if using natural gas exclusively, would consume 860 Mcf per year.

While this consumption per vehicle is relatively high, the number of buses in America is relatively small. Almost 20,000 natural gas buses that use only natural gas would have to be placed in service before the increment of added gas consumption would reach one-tenth of 1% of the national gas consumption in 1987.

The attached and previously referenced study by two former DOE officials, Natural Gas: A Strategic Resource for the Future, provides a national perspective on possible gas demand for NGVs. The study speculates that, with low-cost but supportive public policies and vigorous efforts by the gas industry, natural gas could attain the following market shares by 2010:

-5% of the mass market for passenger vehicles

-25% of the market for public and private fleet vehicles (excluding military vehicles)

-75% of the market for commercial buses

These are reasonably ambitious market penetration goals for the natural gas industry. Yet the study concludes that, even if these goals were reached, gas demand for NGVs would be 1.7 Tcf per year, a very manageable amount of gas.

This is roughly 10% of the actual nationwide gas consumption in 1987.

COMPETITION BETWEEN NATURAL GAS AND OTHER ALTERNATIVE FUELS

Need For a Balanced Transportation Fuel Mix

We know the alternative transportation fuels market is not limited to natural gas and propane. Methanol, ethanol and electricity are also seeking shares of this market. Other energy sources, such as hydrogen, may enter this market in the future.

The gas industry would exclude no energy source from this market. We strongly favor an approach that would permit all energy sources to compete on their own merits, restrained only by the needs of the customers and the public policy requirement that all of the competitors must meet acceptable standards for improving air quality.

Just as we would exclude no energy source from performance-oriented competition, so we would object vigorously and vocally to any effort to exclude natural gas from competing on its merits in this market.

Strong Points of Natural Gas

The natural gas industry is confident that its product will ultimately be a popular choice in the alternative transportation fuels market. There are strong reasons for this confidence.

First, for a wide range of pollutants, gas is the cleanest-burning transportation fuel. This fact carries great weight at a time when several dozen urban areas have failed to meet the Clean Air Act deadline for attaining ozone and carbon monoxide standards.

Second, as we noted earlier, gas supplies come mostly from the U.S.A. and almost exclusively from North America.

Third, as we have also noted earlier, natural gas has the advantage of high energy efficiency. This is a major reason for our clean-burning characteristics -- and for the low operating costs of our vehicles.

Fourth, while there are obviously many compressors and refueling stations to build, the gas industry already has in place a million-mile delivery system that brings natural gas to nearly every street corner in America.

Fifth, while newly manufactured dedicated vehicles are our ultimate goal and would attain the best overall air quality improvements and performance, the gas industry does not have to wait for Detroit since existing gasoline vehicles can be retrofitted to natural gas immediately.

CONCLUSION

A.G.A. and the NGV Coalition are confident that a fleet vehicle alternative fuels program could be implemented in a practical and workable fashion. Moreover, concentration of this program in fleets would serve the purpose of driving technology to improve so that alternative fuel vehicles could be used in broader applications. Improved technology could also yield lower vehicle emissions. Natural gas vehicles can make a dramatic contribution to cleaner air. They can make a significant contribution to reduced reliance on a foreign energy source, and, correspondingly improve our trade deficit. We have a technology that works, and we have the gas supplies to back up that technology. There is no reason to restrain the expanded use of NGVs. There is every reason to encourage it.

Because of the relatively low price of natural gas, as compared to gasoline, the environmental benefits associated with natural gas can be achieved along with an economic benefit. The cost of controlling vehicular emissions with natural gas can be quantified and may provide a significant economic incentive to use natural gas. Two A.G.A. studies are enclosed, Cost of Vehicular Emissions Control with Natural Gas and An Analysis of the Economic and Environmental Effects of Natural Gas as an Alternative Fuel, that fully discuss this point.

We urge the Members of this Committee to support amending S. 1630 to include an alternative fuels program for fleet vehicles.

WRITTEN TESTIMONY OF

JAMES T. POLLARD
SENIOR VICE PRESIDENT
SOUTHERN CALIFORNIA GAS COMPANY
LOS ANGELES, CALIFORNIA
BEFORE THE
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS
UNITED STATES SENATE
ON THE USE OF ALTERNATIVE
FUEL VEHICLES
January 11, 1989

Mr. Chairman and Members of the Committee. My name is Jim Pollard, and I am Senior Vice President for the Southern California Gas Company. I appreciate this opportunity to testify on the importance of developing an alternative fuels program.

We commend you and your colleagues for the effort you have made to see that clean air legislation is enacted. We recognize the complexity of the issue, and are committed to helping to develop sound policy solutions to the air pollution problem facing this country.

As you may know, Southern California suffers from the worst air pollution in the nation. My Company's service territory overlaps ten pollution control districts, five of which are currently in nonattainment of the national standards for at least one of the criteria pollutants. The extent and nature of the air pollution problem is due to a combination of factors: a unique meteorological and geographical setting, a diverse and dynamic economy, a large population expected to grow by almost 40 percent over the next 20 years, and an expanding number of vehicles traveling roughly 20 percent of all the miles driven in the country.

To help cities achieve clean air, we strongly support the implementation of an aggressive clean fleet program in all serious and severe nonattainment regions. But as important as a strong clean fleet program will be to improving air quality, by itself it's not enough. Concurrent with a strong alternative fuel fleet program, we support strict tailpipe emission standards, such as those outlined in S. 1630 for Phases I and II.

In May, I testified in favor of the strong tailpipe emissions standards in H.R. 2323. Southern California Gas Company now supports the Waxman-Dingell amendment to H.R. 3030, in the belief that it is an honest effort to implement standards that will achieve clean air without disabling important industries in our country. I strongly encourage you to implement similar -- or even stronger -- requirements in S. 1630.

As you will see when I discuss the details of our proposed alternative fuels program, the program's performance standards are based on a percentage reduction from motor vehicle emissions from the general populace. When Phase II standards are implemented, we anticipate that technology will be able to produce even cleaner alternative fueled vehicles than those now in existence. We seek regulations that will reasonably push technology, as Phase II standards will do. We believe that a requirement for fleets to be significantly cleaner than regular passenger vehicles is essential for the development of a successful alternative fuels program. If the passenger vehicle tailpipe emissions standards are not strict, then an alternative fuel fleet program will, in my estimation, have little chance of being run on clean fuels.

I emphasize mobile source emissions because in a very real sense it is the amount of emissions from these vehicles that is the principal source of our area's air quality problems. Yet, while mobile sources account for 52 percent of hydrocarbons and 72 percent of NOx emissions (the precursors of ozone), federal legislation has principally focused on stationary sources.

Southern California Gas Company continues to advocate equity between stationary and mobile sources, both in terms of emissions reductions and in terms of the cost of control measures. Stationary sources have already reduced emissions, and at considerable cost. In Los Angeles, new stationary sources spend up to $25,000 per ton of NOx reduction and $17,500 per ton of NMHC reduction. At the same time, costs for mobile source NOx reduction are about $1200 per ton, and $1800 per ton of NMHC reduction. We believe there is a legitimate federal concern here, since 15-20% of the vehicle miles traveled in Southern California are in vehicles not built to adhere to California's tougher standards. This continued inequity will place an unfair burden on stationary sources and will take our focus away from mobile emissions, the major source of pollution in our region.

From our perspective, reducing mobile source emissions and developing a clean fuels program is the next logical step if severe nonattainment areas are ever to achieve clean air goals, and if the business community is to see a more equitable distribution of pollution control measures.

I cannot stress this point too strongly -- reducing mobile source pollution will require comprehensive federal legislation that reduces tailpipe emissions and establishes an alternative fuels program that has, as its cornerstone, stringent emission standards for vehicles operating in nonattainment areas.

In its mobile emissions inventory, the South Coast Air Quality Management District estimates that 550 tons of reactive organic gases (ROG), 600 tons of nitrogen oxides (NOx), and 4700 tons of carbon monoxide (CO) are emitted per day in the basin. According to published reports by the Environmental Protection Agency, using compressed natural gas as a vehicular fuel can result in a 85 percent reduction of ROG, a 65 percent reduction of NOx and a 95 percent reduction of CO.

For the sake of illustration, let's assume that fleet vehicles, which comprise approximately one-eighth of the vehicles in the basin, were converted to run on natural gas. We would expect to see ROG emissions reduced 10 percent, or 55 tons, NOx emissions reduced by 8 percent, or 48 tons, and CO emissions reduced by 12 percent, or 564 tons per day. As you can see, even a very moderate phase-in of an alternative fuel like CNG for fleet vehicles results in significant air quality benefits.

SoCalGas' Interest in Air Quality

As a company whose product is a fossil fuel that is combusted to provide needed energy for a variety of industrial, commercial and residential uses, we recognize that even though natural gas is the cleanest burning fossil fuel, we are nonetheless part of the air pollution problem in Southern California. But for many years, Southern California Gas Company also has been a leader in the effort to improve air quality.

Our region has largely eliminated the use of dirtier fuels such as coal and oil in many of our stationary source combustion processes. As a result, air quality has marginally improved. But, it has been strict vehicle emission standards, as well as the use of clean burning natural gas, that has helped the region to achieve emission reductions greater than anywhere else in the country. Even so, more must be done for the region to meet national air quality standards.

SoCalGas was one of the first businesses to support the local Air Quality Management Plan. We have worked with the SCAQMD in its efforts to have its plans adopted and continue to work with the District in the development of rule-making to help implement a cost effective and technologically feasible emissions reduction control program.

Development of a Federal Alternative Fuels Program

Recently, Southern California Gas Company organized a meeting of key utility technical experts from around the country as to how best craft an alternative fuels amendment to S. 1630. As many of you are aware, up to that point the natural gas industry had been unable to present to you, or to your colleagues in the House, an alternative fuels program that representatives of our industry could agree upon. I'm pleased to report that the meeting was very productive, and resulted in industry consensus on a number of key points relative to an alternative fuels program. I would like to share the highlights of that meeting with you as they form the foundation of the industry's alternative fuels program.

We believe that Congress should develop, as part of its effort to improve air quality, legislation that encourages the use of clean fueled fleet vehicles in ozone and carbon monoxide nonattainment areas.

A critical component of an alternative fleet program is that all alternative fuels be permitted the opportunity to qualify as a "clean" fuel provided that they are able to meet stringent emissions standards. While I have recited the benefits of natural gas, the standards should not be based on emission reduction from any one fuel, but rather on what emission reduction is necessary to achieve clean air goals. This will permit all fuels to compete equally in the market.

The promotion of unbiased regulations will encourage market diversity, and will spur technological development and alleviate energy security concerns. Every fuel offers unique environmental benefits, safety considerations, or supply and distribution issues. While I feel confident of the benefits of natural gas usage as a vehicular fuel, it is my opinion that the severity of the air quality problem necessitates that legislation permit all fuels to compete to meet stringent emissions standards.

We support the establishment of a 30 percent lower nonmethane hydrocarbon standard for light-duty alternative fueled vehicles. This should be based on 1994 in-use emissions standards for the entire vehicle population. Thus, fleets of 10 or more vehicles that are capable of central refueling will have to be 30 percent cleaner than the general vehicle populace. These standards should apply to evaporative and exhaust emissions combined. By the year 2000, the standard should increase to an aggressive 80 percent reduction over general vehicle requirements. For air toxics, we support a 40 percent emissions reduction below conventional vehicles by 1994 and a 90 percent reduction by the year 2000.

We also believe that the emission standard should consider the ozone forming reactivity of a fuel's emissions, and should permit a less reactive fuel to achieve a less stringent standard. Reactivity should be included as a measure of actual pollution reduction benefit.

We also support the inclusion of medium and heavy-duty vehicles in an alternative fuels program. The percentage reduction requirements of nonmethane hydrocarbons and toxics for these vehicles should be identical to what I proposed for light-duty vehicles: 30/40 percent reduction in 1994 and an 80/90 percent reduction in the year 2000. Reactivity considerations should also be included.

Finally, we would like to see an alternative fuels program instituted within 18 months of the Clean Air Act's reauthorization that would ultimately require 90 percent of new motor vehicles owned or operated by any fleet operator to be clean fuel vehicles when operating in a serious, severe or extreme nonattainment area. Fleet owners should be required to convert their fleet, including both new vehicles and retrofits, to use only clean fuels. We propose a phased-in percentage, beginning with 10 percent in 1994, up to 90 percent in 2002. A fleet vehicle mandate is critical to an alternative fuels program in serious and severe ozone and carbon monoxide nonattainment areas. By requiring fleets to use clean fueled vehicles, the needed stimulus for vehicle demand would be created. This approach would permit the market, rather than legislation, to dictate production of the kind of vehicle to satisfy congressional goals.

New Technology

As the largest distributor of natural gas in the country, Southern California Gas Company believes that natural gas can play a significant role in improving air quality. Natural gas is the most environmentally desirable fossil fuel, producing fewer nitrogen dioxide emissions, and much less carbon monoxide, than other fossil fuels. Additionally, natural gas is an economic vehicular fuel, and is in abundant supply.

There have been significant improvements in natural gas vehicle technology in the last decade, and further advancements are predicted. Southern California Gas Company continues to take a leadership role in developing natural gas vehicles. We are working with the Los Angeles Rapid Transit District on a program to substitute natural gas vehicles for diesel. We are piloting a program to determine the effectiveness of light-duty vehicles operating on natural gas by means of demonstrations and research projects.

Concurrent with natural gas vehicle technological developments, there are approximately 30,000 natural gas vehicles operating on the road in the United States today, ranging from buses, trucks, and delivery vans to passenger cars. Worldwide, there are 700,000 natural gas vehicles in operation. Italy has almost 300,000 natural gas vehicles, the USSR has about 200,000, and Canada, New Zealand and China have extensive experience with natural gas as both a vehicle fuel and in fleet use.

Conclusion

We believe that alternative fueled vehicles can play a significant role in helping cities across the country clean up their air. But it is going to take the commitment of the federal government and industry, working together, to move them from the drawing boards and demonstration projects into people's daily lives.

We need federal legislation that encourages rapid development and application of all low emission, alternative fuel vehicles through the implementation of a national program and increased R & D funding. Equally important, we need federal legislation that will encourage air districts, in the implementation of their plans, to develop creative ways to introduce market incentives to entice changes in industry and individual behavior that will promote cleaner air. Market incentives are crucial to the success of improving air quality.

Mr. Chairman, I applaud you and your Committee for recognizing the severity of the air pollution problem and for searching for meaningful and creative solutions to promote alternative fuel vehicles. Southern California Gas Company believes that clean fuel vehicles can and should play a part in helping cities achieve its clean air goals and should be a part of any national plan.

Thank you again for the opportunity to testify. I would be pleased to answer any questions you may have.

AMERICAN METHANOL INSTITUTE
TESTIMONY

BEFORE THE U.S. SENATE
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS
SUBCOMMITTEE ON ENVIRONMENTAL PROTECTION
WASHINGTON, D.C.
JANUARY 11, 1990

American Methanol Institute
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The American Methanol Institute (AMI) appreciates this opportunity to present a statement for your consideration in evaluating the beneficial current and future roles of methanol as a clean fuel. AMI has recently been formed, representing companies that are now supplying the majority of the U.S. methanol requirements for both fuel and chemical applications. We look forward to supporting your Subcommittee and the Administration in developing a sound clean air policy for the country.

Under existing clean air programs, the automobile industry has made impressive progress in reducing smog-forming vehicle emissions, with greater than 90 percent reductions over the last 15 years. However, it is becoming increasingly clear that cleaner fuel components must now be made available if we are to continue to make progress, particularly given the projected growth in vehicle travel in many of our cities with the worst air quality.

Methanol is a clean-burning, abundant fuel with enormous promise for advancing the Nation's environmental and energy security goals. Already the methanol industry is performing an important role in producing clean fuels, without government subsidy. Our industry is now a major participant in the fuel market because over one-fourth of methanol currently marketed in the United States is used to manufacture the most widely-accepted clean fuel additive today, MTBE.

Congress now has under consideration far-sighted plans to assure greater usage of cleaner fuels. There are several good candidates and all are now in the appropriate process of being evaluated. We are pleased that methanol has been extensively evaluated by the EPA, the auto companies, and the state with the greatest need, California. There is general agreement that methanol can play a major role in achieving the Nation's clean air goals. The California Advisory Board on Air Quality and Fuels (AB 234 Report) recently concluded, after a year of extensive evaluation with participation from the methanol, automobile and petroleum industries, government agencies, and environmental interests, that methanol has the best potential for widespread use in the general vehicle population.

AMI supports aggressive and innovative new uses of clean fuels. We feel the task is sufficiently challenging and the goals are extremely important so that additional uses for competing alternative clean fuels should be evaluated. We are confident that a fair evaluation will conclude that methanol should play an important role in any clean fuel program.

In arriving at future programs, however, it is imperative that we not lose sight of the important contributions already being made. New opportunities must not be allowed to undermine the important progress now being made for fuels such as oxygenated gasoline, reformulated gasoline and clean diesel replacements. For each of these fuel programs, methanol or its derivative, MTBE, has demonstrated its ability to improve our air quality without government subsidy. In moving forward, we must be certain to build on this base and not destroy it. Performance, cost, consumer acceptance and competition should drive the choice of present and future clean fuels.

We know that, in the long term, methanol offers one of the most promising new fuels for both light-duty automobiles and heavy-duty busses and trucks. The proposed developmental programs in California offer promise of continued technical progress building on the existing small fleet in use today by the state.

However, the methanol industry is receiving very confusing signals that could make it difficult to continue supporting the fuel programs as we have in the past.

Our concerns are in two areas, both of which contradict the proven concepts of building on the strong existing base and maintaining fair and equal opportunity for the various clean fuels to compete.

Our first concern is that a 3.1 percent oxygen requirement is at best another hidden ethanol subsidy and more likely, an ethanol mandate. As a practical matter, only ethanol can provide this percentage of oxygen in gasoline. Moreover, this is only possible because existing programs heavily subsidize the high cost of ethanol and exempt the increased vapor pressure that comes from adding an alcohol instead of an ether such as MTBE. We agree with data that show that the overall benefits of oxygen are not linear and that the greatest benefit occurs up to a level of 2 percent. In all events, we believe that anything above 2.7 percent oxygen is unjustified. It would simply operate as another hidden subsidy for uneconomic ethanol. In addition, marketable rights for extra oxygen would unfairly force unsubsidized methanol to provide a further hidden subsidy to the already heavily subsidized ethanol industry, without material environmental gains.

The other major area of concern is that the subsidy for ethanol should not be expanded to reacted products such as ETBE. This would serve no clean air benefit that is not already provided, without subsidy, by the existing MTBE. In addition, it would undermine the very baseload of fuel applications for methanol that are so vital if our chemical industry is to make the commitment required by even a modest clean fuel program. We therefore strongly believe that neither the Treasury nor the Congress should subsidize the production of ETBE.

Looking to the thrust of the Clean Air Act Amendments, we support the concept of an early start for a developmental program in California. Such a gradual program will continue the technical progress for vehicles while minimizing the chance of a loss of confidence by the consuming public. It will also focus the program in the area of greatest need where it will receive strong local support.

This type of well-defined program will further enhance the energy security benefits of methanol. Already methanol is making a major contribution to the Nation's energy security. The United States is the world's largest producer of methanol. Some 75 percent of the methanol consumed in the United States is produced domestically, and of the limited imports more than half come from Canada and over 80 percent come from Western Hemisphere countries and New Zealand. In addition, both the limited imports and domestic methanol contribute to energy security by providing energy diversity and decreasing the country's reliance on imported petroleum products.

Additional environmental and energy security benefits result from the development of a market that will encourage construction of new methanol production facilities, including important domestic facilities, directed to fuel applications. The technology to produce small domestic methanol plants that can compete with the traditional large facilities has only recently been developed. These plants offer exciting new energy security benefits because the raw material can be small pockets of domestic natural gas, waste gas that is normally vented to the atmosphere from garbage dumps, or even the waste products from existing plants that might otherwise threaten the economic viability of those factories. Examples of each of these types of facilities are currently under construction or in the advanced planning stage today.

We believe methanol -- a clean, safe, abundant and inexpensive fuel -- is today and will be in the future an important part of the nation's environmental and energy planning. AMI, representing the methanol industry, stands ready to work with the Congress to establish a firm and viable foundation upon which to build a cleaner future environment.

JOESPH L. KOACH, CAE
Executive Director

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ARIZONA UNITED SERVICE STATION DEALERS ASSN.
SERVICE STATION DEALERS OF ARIZONA
SERVICE STATION DEALERS OF ARKANSAS
CALIFORNIA SERVICE STATION & AUTO. REPAIR ASSN.
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TESTIMONY OF SERVICE STATION DEALERS OF AMERICA ON ALTERNATIVE FUELS

BY
THOMAS D'ANGELIS, PRESIDENT
COLONIAL SERVICE STATION
2430 RICHMAN AVE.
STATEN ISLAND, NY

BEFORE THE
SUBCOMMITTEE ON ENVIRONMENTAL PROTECTION
OF THE
ENVIRONMENT AND PUBLIC WORKS COMMITTEE

UNITED STATES SENATE

THURSDAY, JANUARY 11, 1990

OFFICERS

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TESTIMONY OF
SERVICE STATION DEALERS OF AMERICA
ON ALTERNATIVE FUELS AND CLEAN AIR

MR. CHAIRMAN, MEMBERS OF THE SUBCOMMITTEE, I AM THOMAS D'ANGELIS, PRESIDENT, COLONIAL SERVICE STATION, STATEN ISLAND, NEW YORK.

I AM APPEARING ON BEHALF OF THE SERVICE STATION DEALERS OF AMERICA (SSDA) WHICH, THROUGH ITS 43 STATE AND REGIONAL ASSOCIATIONS, SERVES AS THE VOICE OF AMERICA'S 60,000 INDEPENDENT GASOLINE RETAILERS. OUR MEMBERS ARE A MAJOR SEGMENT OF AMERICA'S "SMALL BUSINESS". MEMBERS OF SSDA TYPICALLY OWN AND/OR OPERATE A SINGLE SERVICE STATION WHICH IS THEIR SOLE MEANS OF FAMILY SUPPORT.

TODAY, I WOULD LIKE TO DISCUSS SSDA'S POSITION ON ALTERNATIVE FUELS, WITH THE FOCUS ON THE CRITICAL IMPACT OF SUCH PROGRAMS ON MOTOR FUEL DEALERS SUCH AS MYSELF. SSDA SUPPORTS DEVELOPMENT OF ALTERNATIVE FUELS PROGRAMS, AND SO TESTIFIED BEFORE THIS SUBCOMMITTEE IN THE LAST CONGRESS. WE ALSO SUPPORTED THE SHARP-ROCKEFELLER ALTERNATIVE FUELS ACT OF 1987.

FIRST, LET ME POINT OUT THAT CONGRESS CANNOT LOOK AT THIS SEGMENT OF THE CLEAN AIR ACT IN ISOLATION FROM THE OTHER SEVEN (7) MAJOR ENVIRONMENTAL PROGRAMS WE ARE CURRENTLY IMPLEMENTING.

IN PARTICULAR, WE ARE CONCERNED WITH THE EFFECTS OF AN ALTERNATIVE FUELS PROGRAM ON OUR ONGOING EFFORTS TO PROTECT THE NATION'S GROUNDWATER FROM ENVIRONMENTALLY - HAZARDOUS UNDERGROUND STORAGE TANKS.

MANY DEALERS HAVE ALREADY SPENT A SUBSTANTIAL PORTION OF THEIR NET WORTH REPLACING THEIR TANKS, SOME IN A FUTILE EFFORT TO GET TANK INSURANCE, OTHERS BECAUSE STATE LAWS REQUIRE THEM TO DO SO.

IN MY OWN CASE, I PURCHASED MY STATION IN 1985 AFTER MY SUPPLIER OFFERED IT TO ME DUE TO THEIR DIVESTITURE IN MY AREA. SOON AFTER, THE REGULATIONS FOR UNDERGROUND TANKS AND STAGE II BECAME VERY APPARENT AND I KNEW THAT I WOULD HAVE TO MAKE SOME ADDITIONAL AND SIGNIFICANT INVESTMENTS IN THE PROPERTY IN ORDER TO COMPLY WITH THE LAWS. WHAT WAS A HOPE FOR ACHIEVING THE AMERICAN DREAM HAS NOW BECOME A NIGHTMARE. THE TOTAL COST OF RENOVATION TO COMPLY WILL BE IN THE AREA OF $250,000.

THE BUREAUCRACY WHICH REGULATES THE REPLACEMENT OF TANKS, ESPECIALLY IN THE NEW YORK CITY AREA, IS UNBELIEVABLE. THE COST OF THE INSTALLATION HAS ESCALATED BECAUSE OF THE UNNECESSARY REGULATORY PROVISIONS. THE REMOVAL OF GASOLINE ALONE FROM THE BOTTOM OF THE TANK COST ABOUT $500 FOR THE TRUCK AND 66 CENTS A GALLON FOR ANY PRODUCT LEFT IN THE TANKS. THIS PROCESS, THE REGULATORY AGENCY WHICH ISSUES THE PERMITS, THE ARCHITECT, AND THE INSTALLERS HAVE ALL CREATED PROBLEMS FOR ME IN MY ATTEMPTS TO COMPLY WITH THESE UNREASONABLE AND BURDENSOME REQUIREMENTS FOR NEW TANK INSTALLATION. IF I AM FORCED TO INSTALL ALTERNATIVE FUEL TANKS IN THE FUTURE, I WILL HAVE TO REPLACE MY BRAND NEW TANKS, FOR WHICH THE COSTS HAVE ALREADY STRETCHED ME FINANCIALLY AS FAR AS I CAN GO. THEREFORE, I WOULD HAVE NO CHOICE BUT TO GO OUT OF BUSINESS UNLESS SOME SOLUTION WAS FOUND FOR ALLEVIATING MY FINANCIAL HARDSHIP.

THE NATION'S SERVICE STATION DEALERS' MAJOR CONCERN IS WITH METHANOL AS AN ALTERNATIVE FUEL. ADVOCATES OF SUBSTITUTING METHANOL FOR GASOLINE IN MILLIONS OF AMERICAN CARS SAY METHANOL WOULD BE A PRACTICAL, AFFORDABLE, SAFE WAY TO REDUCE AIR POLLUTION. THEY ALSO SAY IT WOULD DECREASE THE NATION'S DEPENDENCE ON FOREIGN ENERGY, REDUCE GLOBAL WARMING, AND MEET WITH CONSUMER ACCEPTANCE.

AMERICA COULD USE SUCH A "WONDER" FUEL TO HELP SOLVE ITS AIR QUALITY PROBLEMS. HOWEVER, AS THE FOLLOWING QUESTIONS AND ANSWERS SHOW, THAT FUEL IS UNLIKELY TO BE METHANOL:

Q. WOULD METHANOL BE A COST-EFFECTIVE WAY TO REDUCE POLLUTION?

A. MOST EVIDENCE SUGGESTS IT WOULD NOT. FUTURE METHANOL VEHICLES WOULD NOT BE MUCH CLEANER THAN TOMORROW'S GASOLINE VEHICLES OPERATING ON IMPROVED GASOLINES. YET METHANOL WOULD PROBABLY COST MORE PER GALLON THAN GASOLINE. ALSO, METHANOL VEHICLES WOULD BE MORE COSTLY TO PURCHASE AND MAINTAIN.

THE OFFICE OF TECHNOLOGY ASSESSMENT (OTA) REPORTS THAT METHANOL WOULD BE THE LEAST COST-EFFECTIVE OF NEW STRATEGIES TO REDUCE OZONE. FOR EXAMPLE, A METHANOL PROGRAM WOULD REDUCE POLLUTION AT THE COST OF NEARLY $40,000 PER TON. THAT IS ABOUT TEN TIMES GREATER THAN THE COST OF IMPROVING INSPECTION AND MAINTENANCE OF THE POLLUTION CONTROL EQUIPMENT ON GASOLINE VEHICLES, AND IMPROVED INSPECTION AND MAINTENANCE WOULD REDUCE MORE THAN TWICE AS MUCH POLLUTION AS A METHANOL PROGRAM.

Q. WOULD METHANOL BE SAFE?

A. METHANOL IS MORE POISONOUS THAN GASOLINE AND IS LISTED AS A RCRA HAZARDOUS SUBSTANCE. METHANOL CAN BE ABSORBED THROUGH THE SKIN WHICH IS A RISK TO CONSUMERS WHEN THEY FILL UP THEIR TANKS.

Q. WOULD METHANOL BE ACCEPTABLE TO CONSUMERS?

A. METHANOL FUEL AND VEHICLES WOULD BE HARD TO SELL TO CONSUMERS FOR SEVERAL REASONS INCLUDING THE HIGH COST AND POSSIBLE SAFETY HAZARDS OF THE FUEL. FUEL MILEAGE WOULD BE WORSE BECAUSE IT TAKES ALMOST TWO GALLONS OF METHANOL TO GO THE SAME DISTANCE AS A GALLON OF GASOLINE. FINALLY, THE CARS COULD BURDEN CONSUMERS WITH ENGINE WEAR AND COLD START PROBLEMS THAT ARE NOT CUSTOMARILY PRESENT IN VEHICLES POWERED BY CONVENTIONAL GASOLINE.

WE BELIEVE THAT THE ONLY WAY TO HANDLE METHANOL SAFELY IS TO USE A SECONDARY CONTAINMENT SYSTEM. IT CAN BE ARGUED THAT WE ARE LEGALLY REQUIRED TO USE SECONDARY CONTAINMENT DUE TO RCRA. HOWEVER, WE ARE PRIMARILY CONCERNED WITH THE EFFECTS OF A METHANOL TANK LEAK. UNLIKE GASOLINE LEAKS, METHANOL LEAKS ARE SUBJECT TO POTENTIAL SUPERFUND LIABILITY. SSDA STRONGLY DISAGREES WITH THE VIEW THAT A METHANOL TANK LEAK IS OF LESS CONCERN THAN A GASOLINE LEAK BECAUSE OF METHANOL'S MISSIBILITY IN WATER.

INDEPENDENT DEALERS ARE AS CONCERNED ABOUT CLEAN WATER AS ANYONE ELSE, AND OUR FAMILIES HAVE TO DRINK THE SAME WATER THAT WOULD BE CONTAMINATED BY LEAKS. OUR CUSTOMERS, FRIENDS AND THE GENERAL PUBLIC SHOULD BE MADE AWARE OF THE FRIGHTENING HEALTH EFFECTS OF METHANOL.

GIVEN THAT METHANOL WOULD REQUIRE SECONDARY CONTAINMENT TANKS, LET ME, AS A DEALER, WALK YOU THROUGH HOW INSTALLING SUCH TANKS COULD EFFECT THE NATION'S INDEPENDENT DEALERS AND THEIR CUSTOMERS.

IN MANY CASES, WE ARE TALKING ABOUT REPLACING BRAND NEW GASOLINE TANKS INSTALLED TO MEET ONE SET OF REGULATIONS IN ORDER TO MEET OTHER NEW SETS OF REGULATIONS. YOU DON'T HAVE TO BE A BUSINESSMAN TO RECOGNIZE THAT THIS JUST NOT MAKE ANY SENSE. FOR EXAMPLE, IN SOUTHERN CONNECTICUT, DEALERS REPLACED THEIR TANKS IN COMPLIANCE WITH STATE LAW. UNDER THE CURRENT ADMINISTRATION PROPOSAL, THOSE DEALERS WOULD HAVE TO RIP OUT THESE NEWLY INSTALLED TANKS TO PUT IN THE NEWER ALTERNATIVE FUEL TANKS.

I WOULD LIKE TO ASK THIS COMMITTEE WHERE YOU EXPECT INDEPENDENT SMALL DEALERS TO GET THE MONEY FOR THIS?
ALL OF THESE REQUIREMENTS ADDED TO STAGE II VAPOR RECOVERY RETROFITTING COSTS, AND THE COSTS OF OTHER MAJOR RULEMAKINGS HEAPED UPON THE NATION'S INDEPENDENT DEALER, CAN EASILY BE THE CAUSE OF MANY MORE THOUSANDS OF DEALERS CLOSING DOWN THEIR BUSINESSES. THIS WOULD ADD EVEN MORE PEOPLE TO THE UNEMPLOYMENT ROLLS, DEPLETING TAX REVENUES FOR LOCAL COMMUNITIES AND STATES, AND UPSET OUR ALREADY FRACTURED MARKETING SYSTEM FOR DELIVERING GASOLINE TO YOUR CONSTITUENTS. IT WAS ONLY A FEW WEEKS AGO THAT SSDA GOT AN INQUIRY FROM A RURAL REGIONAL ECONOMIC DEVELOPMENT GROUP IN ILLINOIS AND INDIANA COMPLAINING THAT THEIR CITIZENS HAD TO DRIVE ANYWHERE FROM 12 TO 25 MILES TO GET GAS. THIS COULD HAPPEN NATIONWIDE.

CONSIDERING THAT THE AVERAGE INDEPENDENT DEALER IN THE U.S. HAS A NET WORTH OF ONLY $81,000 AND EQUIPPING A STATION WITH SECONDARY CONTAINMENT WOULD COST ANYWHERE FROM $80,000 TO $120,000 COMPARED TO $50,000 TO $75,000 FOR CONVENTIONAL TANKS, IT IS NOT DIFFICULT TO SEE THAT THE CLOSING OF MORE INDEPENDENT STATIONS IS A CONSEQUENCE LEGISLATORS MUST CONSIDER. UNLIKE THE VOODOO NUMBERS USED TO CONVINCE THIS COMMITTEE, STAGE II IS COSTING APPROXIMATELY $24,000 TO $30,000 PER STATION TO INSTALL. BY MANDATING MORE REGULATIONS, THIS COST WILL ESCALATE. NO SMALL BUSINESS GROUP HAS EVER BEEN ASKED TO DO SO MUCH TO IMPLEMENT ENVIRONMENTAL REGULATIONS AT ONE TIME AS HAVE AMERICA'S SERVICE STATION DEALERS. NO OTHER INDUSTRY'S SURVIVAL IS MORE THREATENED. THE LOSS OF THE SMALL INDEPENDENT DEALER NETWORK WILL BE AMERICA'S LOSS. WE CERTAINLY ARE IN SUPPORT OF PRESIDENT BUSH'S RECENT STATEMENT EARLY IN JANUARY WHEN HE SAID THAT HE REJECTS ANY CLEAN AIR BILL THAT WOULD IMPOSE AN UNDUE ECONOMIC HARDSHIP ON INDUSTRY. MEMBERS OF THIS COMMITTEE, PLEASE UNDERSTAND THAT OURS IS AN INDUSTRY THAT WOULD SUFFER UNDUE ECONOMIC HARDSHIPS. LIKE PRESIDENT BUSH, WE TOO ARE FOR A CLEANER, SAFER ENVIRONMENT WITHOUT JEOPARDIZING THE ECONOMY OR THE JOBS ON WHICH ALL AMERICA DEPENDS.

AS MENTIONED BEFORE, INSURANCE IS A PRIME CONCERN FOR DEALERS. IT IS NEARLY IMPOSSIBLE AND PROHIBITIVELY EXPENSIVE TO GET TANK INSURANCE NOW. METHANOL WOULD ADD SUPERFUND LIABILITIES TO OUR STATIONS, FURTHER PREVENTING DEALERS FROM GETTING THE REQUIRED INSURANCE. THIS COMMITTEE IS FULLY AWARE THAT INSURERS AVOID SUPERFUND SITES. THIS IS ONE REASON THIS COMMITTEE WORKED SO HARD IN 1985-86 TO KEEP THE UNDERGROUND TANK PROGRAM OUT OF SUPERFUND.

FINALLY, LET ME PAINT THE INDEPENDENT DEALER'S DILEMMA AS IT RELATES TO AMERICA'S FINANCIAL COMMUNITY. IN MANY AREAS OF THE COUNTRY, BANKS WILL NOT LEND MONEY TO SERVICE STATION DEALERS BECAUSE OF THE OVERRIDING FEAR THAT THEY WOULD INHERIT ENVIRONMENTAL LIABILITY, PARTICULARLY AS IT RELATES TO UNDERGROUND TANKS. ALTERNATE FINANCING SOURCES MUST BE MADE AVAILABLE TO US IF WE ARE TO BE ABLE TO COMPLY WITH ENVIRONMENTAL DEMANDS. FOR EXAMPLE, THE PROCESS MUST BE SIMPLIFIED FOR OUR SMALL BUSINESSES TO OBTAIN GUARANTEED SBA LOANS TO IMPLEMENT ANY SERVICE STATION RETROFITTING THIS CONGRESS MAY LEGISLATE. THIS IS EXTREMELY IMPORTANT IF WE ARE EXPECTED TO FULFILL OUR ROLE IN MAKING ANY CLEAN AIR LEGISLATION WORK.

MY TESTIMONY HAS FOCUSED PRIMARILY ON METHANOL BECAUSE IT IS THE MOST HIGHLY TOUTED OF THE ALTERNATIVE FUELS, AND IT HAS SEEN THE MOST EXPERIMENTATION SO FAR IN OUR COUNTRY.

SSDA BELIEVES THAT ANY ALTERNATIVE FUELS PROGRAM MUST BE FUEL NEUTRAL, WITH NEITHER SUBSIDIES NOR MANDATES FAVORING ANY PARTICULAR FUEL. SSDA'S POSITION ON ETHANOL, NATURAL GAS AND OTHER FUELS ARE INCLUDED IN OUR STATEMENT FOR THE RECORD.

I APPRECIATE THE OPPORTUNITY TO TESTIFY BEFORE YOU TODAY. SSDA'S COUNSEL AND I WILL ANSWER ANY QUESTIONS YOU MAY ASK OF US AT THIS TIME.

END

[NOTE: Attachments to this statement have been retained in committee files.]

STATEMENT OF THE

NATIONAL AUTOMOBILE DEALERS ASSOCIATION

BEFORE

THE SUBCOMMITTEE ON ENVIRONMENTAL PROTECTION

OF THE

SENATE ENVIRONMENT AND PUBLIC WORKS COMMITTEE

ON

ALTERNATIVE FUELS

JANUARY 11, 1990

National Automobile Dealers Association
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(202) 547-5500

Mr. Chairman and Members of the Subcommittee:

My name is Jim Willingham, and I am a Buick-GMC and Lincoln-Mercury dealer from Long Beach, California. I am also a NADA Director representing Southern California and serve as Chairman of NADA's Governmental Relations Committee. On behalf of the over 20,000 import and domestic franchised new car and truck dealers, I would like to thank you for the opportunity to testify on Senator Chafee's alternative fuels proposal which could have a significant impact on the small business dealers of this nation.

As with any alternative fuels proposal, the automobile and truck dealers' principal concern ultimately relates to consumer acceptance of the alternative fuel vehicles. Since our livelihood depends on the ability to sell automobiles and trucks, we have gained the experience over the years to recognize the factors that impact a consumer's decision to purchase a particular model or type of vehicle.

NADA feels that a properly structured alternative fuels program is an innovative approach which may provide additional clean air benefits, and we compliment Senator Chafee and those Members of the Subcommittee who have worked so hard on this proposal.

A key provision in Senator Chafee's alternative fuel proposal, as well as the Administration's bill, is the sales mandate. In the retail new car and truck business, the manufacturer does not sell cars to the ultimate consumer. Independent small business dealers sell the vehicles to consumers. A dealer actually purchases vehicles from the manufacturer and finances these vehicles until they are sold. In the automobile business this financing arrangement is known as floor planning. Historically, dealers have floor planned their inventory at interest rates one to two percent above prime. Under the terms of the alternative fuel proposals, the manufacturers could comply with the provision mandating the sale of alternative fuel vehicles by selling them to small business dealers. If the vehicles do not sell, dealers will be forced to finance them for long periods of time, and at the end of the model year, will have thousands of these cars sitting on their lots. Although some have characterized this provision as one which holds the manufacturers' feet to the fire, the burdens and expenses of an unsuccessful program will be borne by those who have a limited role in its success and those who can least afford a program that fails - the small business automobile dealer.

There are a number of factors relating to an alternative fuels program which will have a profound influence on whether consumers will purchase these vehicles. Consumer acceptance of these cars will ultimately determine the success or failure of the program. However, dealers have no control over many of these factors. Elements crucial to consumer acceptance include:

1. **Model Availability.** Only certain model lines will be produced as alternative fuel vehicles. The manufacturers may select models that are

not popular with the public or do not meet the transportation needs of consumers who may wish to buy alternative fuel vehicles.

2. **Performance.** It is still unclear how alternative fuel vehicles will compare to vehicles powered by conventional gasoline in terms of durability, performance, driveability, and cold-weather starting.
3. **Vehicle Range.** An alcohol-based fuel vehicle achieves only one-half the fuel economy of a conventional gasoline powered vehicle. Since many motorists in urban areas have significant commutes to work, the inconvenience of frequent re-fueling could play a role in product choice.
4. **Cost of Fuel.** The Department of Energy has indicated that alcohol fuels will initially cost more on a per mile basis than gasoline. The public will certainly be aware of the cost difference and this factor will limit consumer interest in these vehicles.
5. **Availability of Fuel.** If the petroleum companies do not provide a convenient supply of "clean fuels", or if consumers even anticipate difficulty in obtaining "clean fuels", a major disincentive will

be created for the purchase of alternative fuel vehicles.

6. **Cost of Vehicle.** The price that manufacturers charge for these vehicles will be critical to the success of the program. Dealers have no influence over manufacturer's pricing policies.

New and innovative automobiles are not always readily accepted by consumers. The fact that these vehicles will be powered by an unconventional fuel may create consumer reluctance to purchase them. This will be especially true if there are misconceptions regarding the product. There will be comparable models, in terms of cost and size, offered for sale that are conventional fuel vehicles. Therefore, consumers will have an option in the marketplace if they are suspicious of alternative fuel vehicles. It may take some time to allay consumer anxiety and educate prospective buyers on the benefits of this program.

During the past few months many dealers have expressed their concerns to Committee members over the potential burdens and financial hardships they will experience if consumers do not purchase these vehicles. We commend the Committee for recognizing this problem and for responding to our concerns by requiring manufacturers to provide alternative fuel vehicles to dealers on a consignment basis. The Chafee proposal provides that this arrangement is to be in effect for the first year of the program. While this certainly gives dealers some relief from the disastrous impact that would result from a failed program, we feel that an eighteen month period would be more appropriate. If the program is not a success in the first year, it will become necessary for the manufacturers to make adjustments in the vehicles or in their advertising and marketing programs. We believe that an additional six months of consignment is necessary to protect dealers from the burdens of having to finance the mistakes and failures of huge multinational petroleum and automobile companies over which we have no control.

We have one additional suggestion which we think is necessary to make the consignment proposal work. Language should be inserted which provides that vehicles given to dealers on consignment shall remain on consignment until the vehicles are sold or taken back into the possession of the manufacturer. This would avoid pressure on dealers to purchase the consigned vehicles at the end of the statutory consignment period.

Mr. Chairman, in fairness to the automobile manufacturers, we should make one observation. Even the best and most conscientious efforts on their part may not result in broad consumer acceptance of these vehicles. For that reason, a statutory mandate to produce these vehicles over a number of years may create significant problems for the automobile industry. However, if Congress sees fit to establish an alternative fuels program, the dealers of this nation will actively work to make the program a success. All that we ask is that small business dealers be protected for a limited period in order to prevent financial devastation while those who have control over the success of the program prove to the public that the vehicles work and that fuel is available.

ADDENDUM:

Alternative Fuels Fleet Provision

One element of the Chafee proposal that concerns NADA is the "fleet provision." While the summary of the proposal does not provide a detailed description of the provision, it seems that fleet operators may be required to retrofit or convert their vehicles to burn natural gas or other "clean fuels". Automobile dealers could be considered fleet operators because of their "demonstrator" fleet. The conversion requirements are impractical in regard to these vehicles for several reasons. First, the holding period for dealer fleets is extremely short. Most of these vehicles are held for only three to four months. For that reason, a requirement to convert these cars would be inordinately expensive. Second, the dealer would be demonstrating a vehicle to a prospective customer that is different from the vehicle that the customer would be purchasing. Senator Breaux has done considerable work on the fleet question and has agreed that dealers should be excluded from this provision. Inasmuch as the provision simply does not work in regard to franchised new car and truck dealers, we ask that the Committee adopt Senator Breaux's conclusion and exclude dealers from the fleet provision.

TESTIMONY OF

THE SOUTHERN CALIFORNIA ASSOCIATION OF GOVERNMENTS

BEFORE THE SENATE ENVIRONMENTAL PROTECTION SUBCOMMITTEE
OF THE COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS

Submitted January 12, 1990

THE SOUTHERN CALIFORNIA ASSOCIATION OF GOVERNMENTS (SCAG) APPRECIATES THE OPPORTUNITY TO SUBMIT THIS TESTIMONY WHICH ADDRESSES ONE OF THE MOST IMPORTANT LINKAGES DETERMINING THE ENVIRONMENTAL QUALITY OF LIFE AND HEALTH IN SOUTHERN CALIFORNIA -- IT IS THE LINK BETWEEN REGIONAL TRANSPORTATION SYSTEMS AND THE EFFORT TO MEET HEALTHFUL AIR QUALITY STANDARDS REGIONWIDE.

SCAG IS THE METROPOLITAN PLANNING ORGANIZATION SERVING THE SIX-COUNTY, SOUTHERN CALIFORNIA REGION. PURSUANT TO FEDERAL AND STATE REQUIREMENTS, THE AIR QUALITY MANAGEMENT PLAN PREPARED AND ADOPTED BY SCAG AND THE SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT (SCAQMD) SETS THE DIRECTION FOR BRINGING THE SOUTH COAST AIR BASIN INTO COMPLIANCE WITH STANDARDS BY 2007.

AS A GUIDANCE DOCUMENT, THE AQMP IDENTIFIES AND INCORPORATES A COMPREHENSIVE SET OF LINKAGES AMONG TRANSPORTATION, LAND USE, GROWTH MANAGEMENT, AND REGIONAL HOUSING NEEDS. ADDITIONALLY, THE PLAN IDENTIFIES SPECIFIC CRITERIA TO BE INCORPORATED INTO GENERAL-PURPOSE LOCAL GOVERNMENT LAND USE, ZONING, AND RELATED PLANNING DOCUMENTS.

AMONG THE MEASURES INCLUDED IN THE PLAN ARE: (1) TRANSPORTATION

CONTROL MEASURES, (2) LAND USE MEASURES, AND (3) ENERGY CONSERVATION MEASURES. THESE MEASURES ARE BASED ON REGIONAL POPULATION GROWTH, GENERAL DEVELOPMENT, AND TRANSPORTATION NEEDS FORECASTS. IN ADDITION TO THE AQMP, THE SET OF REGIONAL PLANS INCLUDES THE REGION GROWTH MANAGEMENT PLAN (GMP), THE REGIONAL MOBILITY PLAN (RMP), AND THE ASSESSMENT OF REGIONAL HOUSING NEEDS. TAKEN TOGETHER, THE FOUR PLANS PROVIDE A FRAMEWORK FOR IMPROVING THE AIR WE BREATHE, FOR MAINTAINING ACCEPTABLE TRANSPORTATION MOBILITY LEVELS, AND FOR SHAPING THE FORM OF THE COMMUNITIES IN WHICH WE LIVE BY PROVIDING NEW ALTERNATIVES TO THE WAY REGIONAL POPULATIONS LIVE AND WORK.

TRIP REDUCTION

THE FOUR PLANS COMBINE TO REDUCE FUTURE (2010) VEHICLE TRIPS AND VEHICLE EMISSIONS IN VARIOUS WAYS. REDUCTION OF THE DEMANDS PLACED ON THE REGIONAL INFRASTRUCTURE IS FEASIBLE THROUGH THE IMPLEMENTATION OF TRANSPORTATION DEMAND MANAGEMENT STRATEGIES. DEMAND MANAGEMENT IS, IN ESSENCE, AN EFFORT TO CHANGE MOTORISTS' BEHAVIOR AWAY FROM RELIANCE UPON THE PRIVATE AUTOMOBILE OCCUPIED BY THE SOLE COMMUTER. BECAUSE ACTUAL CHANGES IN LIFESTYLE ARE INDICATED, "GETTING THE JOB DONE" REQUIRES COMMITMENT TO THE PLANS FROM THE REGION'S CITIZENRY SINCE INDIVIDUALS ARE ULTIMATELY RESPONSIBLE FOR MAKING THE CHOICES IMPLICIT WITHIN THE REGIONAL ATTEMPTS TO REDUCE CONGESTION AND AIR POLLUTION. WHILE WORK TRIPS ARE THE MAIN FOCUS AND OCCUR MAINLY DURING PEAK COMMUTE PERIODS, NON-WORK TRIPS ALSO CONTRIBUTE HEAVILY TO OVERALL CONGESTION. AN EFFECTIVE DEMAND MANAGEMENT PROGRAM MUST ATTEMPT TO:

- REDUCE PERSON TRIPS INCLUDING NON-WORK TRIPS (EXAMPLES OF METHODS INCLUDE FLEXTIME, TELECOMMUTING)
- REDUCE VEHICLE TRIPS INCLUDING PERSON TRIPS AND COMMODITY MOVEMENTS (SAMPLE METHODS INCLUDE EMPLOYER RIDESHARE AND TRANSIT INCENTIVES, PARKING MANAGEMENT, MERCHANT TRANSPORTATION INCENTIVES, AND AUTO USE RESTRICTIONS)
- SHIFT RELIANCE FROM SINGLE-PERSON OCCUPIED AUTOMOBILES TO OTHER MODES (FOR EXAMPLE, GREATER USE OF TRANSIT WOULD REDUCE VEHICLE TRIPS, AND ALTERNATE MODES MAY BECOME MORE ATTRACTIVE GIVEN PROPER INCENTIVES)
- REDUCE OVERALL PEAK PERIOD TRAVEL (FLEXTIME AND USER FEES ARE EXAMPLES OF METHODS)

WORK COMMUTES, FOR EXAMPLE WOULD BE EXPECTED TO INCREASE FROM 7.3 MILLION (1984) TO 10.3 MILLION (2010) UNDER A "BUSINESS AS USUAL" CONTINUATION OF HISTORICAL COMMUTING TRENDS. WITH IMPLEMENTATION OF THE PLANS, HOWEVER, WORK COMMUTES ARE PROJECTED TO BE REDUCED BY NEARLY THREE MILLION DAILY TRIPS PRIMARILY THROUGH TELECOMMUNICATIONS/ WORK-AT-HOME AND COMPRESSED WORK-WEEK STRATEGIES, AS WELL AS BY SIGNIFICANT INCREASES IN RIDESHARING (CARPOOL, VANPOOL, BUSPOOL, AND LOCAL TRANSIT USAGE).

GROWTH MANAGEMENT

TRANSPORTATION CONTROL STRATEGIES ARE NOT SUFFICIENT TO BRING MOBILITY AND AIR QUALITY LEVELS TO ESTABLISHED STANDARDS. EFFECTIVE COMMUNITY-BASED GROWTH MANAGEMENT STRATEGIES CAN FURTHER REDUCE OVERALL TRANSPORTATION DEMAND IN TERMS OF VEHICLE MILES TRAVELED -- BY ONE-THIRD. IN ORDER TO SIMULTANEOUSLY ACCOMMODATE NEW RESIDENTS -- THE SCAG REGION EXPECTS FIVE MILLION NEW RESIDENTS BY THE YEAR 2010 -- AND MITIGATE NEGATIVE EFFECTS ON INFRASTRUCTURE AND AIR QUALITY, MANAGEMENT OF GROWTH IS NECESSARY AND SHOULD INCLUDE EFFORTS TO ACHIEVE BETTER JOBS-HOUSING BALANCES. WHEN A JOBS-HOUSING IMBALANCE

EXISTS FOR A SUBREGION OR PARTICULAR JURISDICTION, THE VEHICLE TRIPS AND AIR QUALITY IMPACTS ARE SIGNIFICANT, AND DEPENDING UPON THE AMOUNT OF IMBALANCE, WORKERS MAY BE TRAVELING CONSIDERABLE DISTANCES TO THEIR JOBS. WITH GROWTH MANAGEMENT TECHNIQUES, JOBS-HOUSING IMBALANCES THROUGHOUT THE REGION CAN BE SUBSTANTIALLY MITIGATED WITH A MERE 5% SHIFT IN NEW HOUSING UNITS AND A 9% SHIFT IN NEW JOBS. WHEN COMBINED WITH TRANSPORTATION SYSTEM MANAGEMENT, IT IS ESTIMATED THAT GROWTH MANAGEMENT STRATEGIES WILL ALLOW CURRENTLY PLANNED AND FUNDED TRANSPORTATION INFRASTRUCTURE TO BECOME 30% MORE EFFICIENT IN ITS ABILITY TO SERVICE INCREASED TRAVEL DEMANDS.

GROWTH MANAGEMENT MEASURES THAT LOCAL GOVERNMENTS CAN USE TO ATTAIN JOBS-HOUSING BALANCE INCLUDE:

- REQUIRING DEVELOPERS TO BEAR MITIGATION MEASURES
- LOCATING JOBS-INDUCING FACILITIES IN JOB-POOR SUBREGIONS
- LOCATING HOUSING-INDUCING PROJECTS IN HOUSING-POOR AREAS
- DEVELOPING HUMAN RESOURCES THROUGH WORKER TRAINING AND EDUCATION PROGRAMS TO ATTRACT BUSINESSES TO JOB-POOR AREAS
- REDUCING LIMITATIONS ON HOUSING CONSTRUCTION IN JOB-RICH AREAS.

A NETWORK OF MORE SELF-SUFFICIENT SUBREGIONS WITHIN THE LARGER REGION WOULD NOT ONLY BENEFIT AIR QUALITY AND MOBILITY BUT WOULD ALSO IMPROVE THE QUALITY OF LIFE FOR ALL RESIDENTS. BECAUSE LAND USES CHANGE SLOWLY, IMPLEMENTATION OF GROWTH MANAGEMENT MEASURES IS VIEWED AS LONG-RANGE, AND THEREFORE IT IS EXPECTED THAT THE FULL EFFECT OF GROWTH MANAGEMENT WILL BE FELT ONLY AFTER MANY YEARS.

NEW FACILITIES AND TECHNOLOGIES

CURRENT TECHNOLOGIES ARE NOT ENOUGH TO BRING THE REGION INTO CONFORMITY WITH AIR QUALITY STANDARDS. CONSEQUENTLY, THE AQMP CALLS FOR MEASURES THAT ARE DIRECTED AT SECTORS WHERE SIGNIFICANT EMISSIONS ARE EXPECTED TO EXIST EVEN AFTER THE IMPLEMENTATION OF INITIAL CONTROL MEASURES. TECHNOLOGY DEVELOPMENTS ARE NEEDED IN THE FOLLOWING AREAS: SOLVENTS AND COATINGS, VEHICLE EMISSIONS, PETROLEUM BASED FUEL USES, AND ELECTRIC ENERGY.

THE REMAINING ONE-THIRD OF FUTURE TRAVEL DEMAND MUST BE MET WITH NEW AND EXPANDED FACILITIES AND TECHNOLOGIES TO HANDLE THE SHEER INCREASE IN VEHICLE TRIP VOLUMES. BECAUSE ANTICIPATED VEHICLE TRIP VOLUMES AND RESULTANT VEHICLES MILES TRAVELED ARE EXPECTED TO BE HIGH BY 2010, GREATER EMPHASIS SHOULD BE PLACED ON THE DEVELOPMENT OF VEHICLE EMISSION REDUCTION TECHNOLOGIES INCLUDING CLEAN FUELS IN ORDER TO BRING THE REGION CLOSER TO MEETING CLEAN AIR STANDARDS.

ACCORDING TO THE CALIFORNIA AIR RESOURCES BOARD, THE FOLLOWING ISSUES MUST BE ADDRESSED IN ORDER TO ADEQUATELY ATTEND TO THE VEHICLE/FUEL SIDE OF THE TRANSPORTATION/AIR QUALITY LINKAGE:

- MORE VEHICULAR EMISSION CONTROLS TO ATTAIN AIR QUALITY IMPROVEMENTS
- SHORT-TERM GASOLINE CHANGES TO REDUCE EMISSIONS; EXAMPLES:
  - LOWER BENZENE CONTENT
  - LOWER AROMATIC CONTENT
  - LOWER REID VAPOR PRESSURE
  - DEPOSIT-CONTROL ADDITIVES
- A LONG-TERM PROGRAM TO IMPLEMENT THE USE OF LOW-EMISSION VEHICLES AND CLEAN FUELS. CLEAN FUELS SHOULD BE PHASED IN:

- TRANSITION TO LOW EMISSION VEHICLES: 10% TRANSITIONAL LOW EMISSION VEHICLES (TLEVS) BY 1994; 25% LOW EMISSION VEHICLES (LEVS) BY 1997; AND A FRACTIONAL PERCENTAGE OF ULTRA-LOW EMISSION VEHICLES (ULEVS) BY 1995 BY THE AUTOMOTIVE INDUSTRY
- COMMENSURATE SALE OF CLEAN FUEL BY SUPPLIERS TO MEET LEV, TLEV AND ULEV INTRODUCTION

INCLUDED AMONG THE PROMISING ULEVS ARE ELECTRIC -- AND PERHAPS ROADWAY-POWERED -- DUAL MODE ELECTRIC AUTOS, VANS, AND TRANSIT VEHICLES. SCAG IS CURRENTLY ASSESSING THE REGIONAL IMPACTS OF DEPLOYING AREA-WIDE NETWORKS OF SUCH VEHICLES UNDER CONTRACT WITH THE INSTITUTE OF TRANSPORTATION STUDIES AT THE UNIVERSITY OF CALIFORNIA AT BERKELEY. THIS STUDY IS CALLED FOR IN TIER III OF THE ADOPTED AQMP. THE CONCEPT EMBODIES A DISTRIBUTED ENERGY CONCEPT TO EXTEND THE LIMITED RANGE OF TODAY'S BATTERY-POWERED, ELECTRIC VEHICLES, THEREBY MAKING ELECTRIC TRANSPORTATION MORE PRACTICAL. THE STUDY WILL DETERMINE TRADEOFF ISSUES REGARDING FUEL SUPPLY, ELECTRIC GENERATION, AND RESULTING EMISSIONS IN THE SOUTH COAST AIR BASIN.

LOCAL INVOLVEMENT

THE SUCCESS OF FUTURE AND EXISTING CONTROL MEASURES AND IMPLEMENTATION PROGRAMS IS CONTINGENT UPON COMMITMENT AT THE LOCAL LEVEL. THE INVOLVEMENT OF ALL GOVERNMENT LEVELS, ESPECIALLY LOCAL GOVERNMENT, IS CRITICAL FOR SUCCESS OF THE PLANS, AND THE GROWTH MANAGEMENT AND TRANSPORTATION TASK FORCE IS A NOTEWORTHY EXAMPLE OF A CURRENT EFFORT. CONVENED IN JUNE, 1989, THE TASK FORCE WAS CREATED JOINTLY BY SCAG'S EXECUTIVE COMMITTEE AND SCAQMD'S GOVERNING BOARD TO REVIEW AQMP IMPLEMENTATION CONCERNS. THE TASK FORCE MEMBERSHIP IS DOMINATED BY LOCAL GOVERNMENT REPRESENTATIVES, INCLUDING LOCAL ELECTED OFFICIALS, AND IS CHARGED WITH DELIVERING RECOMMENDATIONS BY JUNE, 1990, FOR (1)

IMPLEMENTATION OF THE GROWTH MANAGEMENT AND TRANSPORTATION MEASURES CONTAINED IN THE 1989 AQMP AND (2) REVISIONS TO THE 1991 AQMP.

FIVE MAIN OBJECTIVES GOVERN THE WORK OF THE TASK FORCE: (1) TO DEVELOP RECOMMENDATIONS ON IMPLEMENTATION GUIDELINES FOR THE TRANSPORTATION, GROWTH MANAGEMENT, AND WASTEWATER PORTIONS OF THE AQMP; (2) TO MAKE RECOMMENDATIONS ON A FUNDING PROGRAM FOR TRANSPORTATION AND LOCAL AIR QUALITY ELEMENTS AND TO ASSESS THE FINANCIAL IMPACTS OF GMP IMPLEMENTATION; (3) TO DEVELOP MARKET INCENTIVE IMPLEMENTATION ALTERNATIVES; (4) TO RECOMMEND IMPROVEMENTS TO SCAG'S AND SCAQMD'S PUBLIC OUTREACH AND EDUCATION PROGRAMS; AND (5) TO COORDINATE WITH THE PUBLIC HEALTH AND SOCIO-ECONOMIC TASK FORCE.

AS CONTAINED IN ITS INTERIM REPORT (SEE ATTACHMENT 1),* THE TASK FORCE HAS PRODUCED ITS INITIAL RECOMMENDATIONS FOR IMPLEMENTATION OF THE GMP, RMP, AND AQMP AND HAS SET FORWARD A WORK PROGRAM FOR THE SPRING. (1) FOR IMPLEMENTATION OF THE GMP, THE TASK FORCE HAS EMPHASIZED THE IMPORTANCE OF WORKING TOWARD JOBS-HOUSING BALANCE. CREATION OF SUBREGIONAL ENTITIES IS ALSO ENCOURAGED. (2) FOR IMPLEMENTATION OF THE RMP -- SPECIFICALLY, THE DEVELOPMENT OF A REGIONAL MASS TRANSIT SYSTEM, THE GROUP HAS RECOMMENDED GREATER INTERJURISDICTIONAL COORDINATION VIA FORMAL INSTITUTIONAL CHANNELS. THE TASK FORCE HAS SUPPORTED FORMULATION OF A SPECIFIC, INTER-COUNTY AGREEMENT AMONG THE COUNTY TRANSPORTATION COMMISSIONS AND THE LOSSAN RAIL CORRIDOR AGENCY. IF SUCH AGREEMENT IS NOT FORGED, THE TASK FORCE HAS DEVELOPED SUBSEQUENT CONTINGENCY MEASURES FOR SCAG TO PURSUE. (3) FOR AQMP IMPLEMENTATION, THE TASK FORCE HAS CALLED FOR INCREASED SPECIFICITY IN THE CONFORMITY GUIDELINES FOR LOCAL AGENCIES AND FOR A SYSTEMS (RATHER

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*The attachment referred to has been retained in committee files.

THAN A PROJECT) APPROACH TO CONFORMITY, AMONG ITS OTHER RECOMMENDATIONS.

THE TASK FORCE HAS STRONGLY EMPHASIZED THE IMMEDIATE NEED FOR MARKET INCENTIVES. THE INCENTIVES ARE CONSIDERED ESSENTIAL AND CAN INCLUDE MEASURES SUCH AS TRADEABLE EMISSION PERMITS, ROAD USE FEES, EMISSION CHARGES, REDUCED PARKING SUBSIDIES, AND CORRECTED TAX POLICIES. **THEREFORE, AS RECOMMENDED BY THE TASK FORCE, THE FEDERAL CLEAN AIR ACT AND THE 1991 AQMP SHOULD INCLUDE LANGUAGE THAT PERMITS THE USE OF MARKET INCENTIVES -- ALTERNATE APPROACHES THAT COMPLEMENT COMMAND AND CONTROL STRATEGIES.** MARKET INCENTIVES WOULD GREATLY BENEFIT PUBLIC AND PRIVATE SECTORS IN THEIR CONFORMITY EFFORTS.

ANOTHER BODY, THE CONFORMITY WORKING GROUP, IS AN ADVISORY GROUP OF MORE THAN 70 LOCAL AGENCIES INCLUDING THE COUNTY TRANSPORTATION COMMISSION. THE GROUP IS ABLE TO BRING TOGETHER REPRESENTATIVES FROM PUBLIC AND PRIVATE SECTORS, REPORTS TO SCAG AND SCAQMD, AND HAS DEVELOPED A SET OF HANDBOOKS THAT PROVIDES STEP-BY-STEP GUIDELINES FOR AGENCIES IMPLEMENTING THE AQMP. THE GROUP'S MEMBERS REGULARLY GATHER TO DEVELOP CLARIFICATION AND GUIDANCE FOR AGENCIES INVOLVED WITH DETERMINING CONFORMITY OF PROJECTS. THE GROUP HAS FOCUSED ITS EFFORTS ON THE THREE MAIN AREAS REQUIRING CONFORMITY OF LOCAL PROJECTS WITH THE AQMP -- TRANSPORTATION, WASTEWATER, AND GENERAL DEVELOPMENT.

CONCLUSION

SCAG IS COMMITTED TO PROVIDING EVERY POSSIBLE OPPORTUNITY TO ASSIST OTHERS THROUGHOUT THE REGION IN CARRYING FORWARD THE WORK OF THE

PLANS. THE GROWTH MANAGEMENT AND TRANSPORTATION TASK FORCE AND THE CONFORMITY WORKING GROUP ARE JUST TWO EXAMPLES OF CURRENT EFFORTS BY SCAG TO STRENGTHEN AND MAINTAIN REGIONAL COMMITMENT TO THE PLANS AND TO EXPAND LOCAL INVOLVEMENT. SCAG, REPRESENTING LOCAL GOVERNMENTS, IS A NEXUS IN THE REGION FOR FORMULATING REGIONAL SOLUTIONS AND, JUST AS IMPORTANT, CAN BE THE NEXUS FOR **MAINTAINING THE NECESSARY COMMITMENT** TO SUCH REGIONAL SOLUTIONS INTO THE FUTURE.

SOLUTIONS IDENTIFIED FOR CLEANING THE REGION'S AIR ARE COMPLEX AND FAR-REACHING. THE FOUR PLANS -- THE AIR QUALITY MANAGEMENT PLAN, THE REGIONAL MOBILITY PLAN, THE GROWTH MANAGEMENT PLAN, AND THE REGIONAL HOUSING NEEDS ASSESSMENT -- ARE THE RESULT OF FIVE YEARS OF INTENSIVE AND COMPREHENSIVE REGIONAL PLANNING AND INCORPORATE THE EFFORTS AND CONTRIBUTIONS OF HUNDREDS OF PEOPLE -- ELECTED OFFICIALS, PUBLIC AGENCIES, PRIVATE INDUSTRY GROUPS, ACADEMICIANS, AND THE GENERAL PUBLIC.

IN ORDER TO CONTINUE TO MEET THE OPPORTUNITIES AND CHALLENGES PROVIDED BY THE TREMENDOUS GROWTH PROJECTED FOR THE SCAG REGION, IT IS TIME FOR EVERYONE -- CITIES, COUNTIES, THE STATE AND FEDERAL GOVERNMENTS, PRIVATE CITIZENS, AND THE PRIVATE SECTOR -- TO BUILD ON THE PARTNERSHIPS INITIALLY FORGED IN DEVELOPING THE PLANS AND TO SHARE IN THE TASK OF ADDRESSING CURRENT PROBLEMS AND IMPROVING THE FUTURE.

THANK YOU.

MARK PISANO, Executive Director
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STATEMENT BY DAVID N. DINKINS
MAYOR
CITY OF NEW YORK
FOR THE SUBCOMMITTEE ON ENVIRONMENTAL PROTECTION
OF THE SENATE ENVIRONMENT AND PUBLIC WORKS COMMITTEE
January 11, 1990

I am pleased to acquaint you with the views of New York City on the need for including a strong alternative fuels mandate in the Senate's proposed amendments to the Clean Air Act Reauthorization (S. 1630). It is one of the major legislative policy determinations I have made in the first days of taking this office, and I am anxious to set a strong course for New York City which will result in the greatest environmental improvements possible in our air quality. New York City is one of over 40 metropolitan areas whose carbon monoxide levels currently exceed Federal standards. We're also one of the 101 urban areas whose ozone levels are above the Federal standards. As the Borough President of Manhattan during the past four years, I have been keenly aware of the need for taking decisive steps at the Federal level which will reduce emissions from vehicles operating in New York City's Central Business District. As much as we ourselves may try to improve conditions locally, we need nationwide standards to deal with interstate and intrastate vehicular traffic. In addition, only a nationwide mandate will force auto manufacturers to make clean burning engines.

In the last four years, New York City has been actively exploring the benefits to be derived from alternative fuel technology. The City, in conjunction with other State and Federal agencies and the private sector, has been operating both methanol and compressed natural gas buses for the last two years. City officials have met with all the major auto manufacturers to discuss the possibility of alternative fuel fleet demonstration vehicles that would utilize methanol or compressed natural gas in light duty sedans. However, these City officials have been repeatedly frustrated in their attempts to work with the automobile manufacturers. Not surprisingly, these frustrations appear to be linked directly to the manufacturers' unwillingness to market alternative fueled vehicles without a Federal mandate.

Thus, we remain stalemated. We can't rely on the availability of alternative fueled vehicles unless manufacturers are forced to produce them and they won't produce them unless Congress mandates the program. For this reason, a strong national alternative fuel program is a necessity in our fight to achieve clean air.

New York City needs a national alternative fuel program to incorporate the following specific points:

- Within 18 months of enactment, EPA should publish the results of a comprehensive study on alternative fuels and vehicles. This study should include fuel and engine emission specifications including values for aldehydes and aromatics and the fuels' respective benefits throughout a useful life of 10 years or 100,000 miles.

- We strongly support the adoption of the two-tiered gasoline emission standards included in S. 1630 in conjunction with an effective alternative fuels program. These combined strategies of alternative fuels and stringent tailpipe standards give us the needed reductions in carbon monoxide, nitrogen oxides, volatile organic compounds and toxics to facilitate attainment for carbon monoxide and ozone.

- We recognize the importance of a transition to alternative fuels through the use of flexible fueled vehicles. New York City stresses the need, however, for the establishment of a dedicated alternative fuel fleet for both private and public fleets in ozone nonattainment areas. Only with dedicated vehicles will the real benefits be realized. In addition, we stress the need for local discretion in fuel and vehicle choice in order to best take advantage of fuel availability, infrastructure needs, costs and effectiveness of such a program.

- I would urge you to ask that EPA guarantee vehicle and fuel availability for such a program as swiftly as possible. Fuel must be widely available and on a cost-competitive basis. Federal action will assure national availability as was the case with the switch to unleaded fuel.

- The strict urban bus program language contained in S.1630 should be retained. We support the annual phase-in schedule by 1994 or soon thereafter, requiring that 10, 25, 60 and 100%, of newly purchased or placed into service buses operate on alternative fuel. In addition, we would like to see the 1991 particulate emission standard of 0.1 grams per brake horsepower hour upheld rather than weakened to 0.25 as has been suggested in the Administration's bill.

- Beyond the strict area-specific fleet and urban bus programs, we also urge you to address the distribution of alternative fuel vehicles for use by private citizens. We support New York State's and the Northeast States for Coordinated Air Use Management's (NESCAUM) current efforts to develop and implement such a program. We recommend that, although funds are scarce, Federal monies be made available to support regional programs for alternative fuel vehicles.

In summary, New York City is committed to meeting the goals of a strong Clean Air Act. Any effective alternative fuel initiative therefore must be an initiative of the Federal government. Individual municipalities cannot achieve clean air standards alone. As Mayor of the City of New York, I promise we will take necessary actions to improve air quality. With your help and a national mandate it can be done.

Testimony of Dr. Gary A. Zimmerman
Chairman of the Council
Municipality of Metropolitan Seattle
presented to the
Senate Environment and Public Works Committee
on Environmental Protection
January 11, 1990

Mr. Chairman and members of the Subcommittee my name is Gary Zimmerman. I am the Council Chairman of the Municipality of Metropolitan Seattle. Metro is the regional transit and sewage treatment operator in the greater Seattle area.

My testimony today will focus on the use of diesel and methanol in the urban transit industry. I hope to convey the following three points:

(1) Methanol is a promising clean fuel, but engine technology needs further demonstration and refinement prior to mandated mass production.

(2) Diesel fuel should be considered a "clean" fuel if its emissions have a comparable range of health effects.

(3) Urban transit should do its part for cleaner air but should not be singled out for peculiarly severe federal mandates.

Thus far, Seattle Metro has the most extensive experience with methanol-fueled buses of any American transit operator.

In 1985, Seattle Metro was in the process of purchasing 157 standard diesel buses. In order to gain experience with methanol as an alternative fuel, Seattle Metro modified the bus procurement to purchase 147 standard diesels and 10 methanol-powered buses. We received no federal grant support for this particular purchase; the entire order was financed by our dedicated local transit sales tax. The 10 methanol buses were identical to the 147 diesels in all regards except those related to methanol. M.A.N. manufactured all 157 of the buses including the engines. This makes our experience somewhat unique since all other methanol bus demonstrations in the United States are utilizing engines manufactured by Detroit Diesel.

Metro was also constructing a new operating base. Base design was modified to support regular operation of methanol-fueled buses. Special considerations including 12,000 gallon underground fuel storage, separate fuel dispensing equipment, explosion proof electrical fixtures at some shop locations and positive ventilation of maintenance pits. The added facility costs were modest in this case, but would be much greater if methanol were to be introduced into existing maintenance facilities.

Since May 1987, the methanol fleet has accumulated over seven million regular service miles. The buses are assigned to regular service daily and are assigned at random to bus operators who have prequalifed for methanol operation.

The operating performance of the methanol bus was comparable to its diesel counterparts in most respects. Acceleration, gradeability, noise and handling are similar. Metro has not experienced difficulties with methanol leakage or spills. Battelle Laboratories found that the amounts of methanol vapor associated with normal fueling and maintenance operations are small enough that all pertinent OSHA and other recommended human exposure limits are satisfied.

The methanol buses, however, were hard to start in cold weather (below 40 degrees F). This was not a critical problem in Seattle where winters are so mild that we store buses outdoors. Cities with colder weather may have particular difficulty with methanol cold starts. Unlike diesel buses, we don't believe methanol buses can be stored safely indoors overnight to keep them warm.

Metro's operating history showed the buses operate 53% less reliably as measured by miles between road calls (about 4,700 miles between road calls versus 2,200 for methanol). I understand other transit operators are also experiencing in-service mechanical problems with their methanol demonstrations buses. In general, buses require repair more frequently and each repair tends to take longer. We believe the corrosive nature of methanol fuel is to blame for many of these mechanical failures. Even though stainless steel parts were installed initially, Metro's buses have experienced cracked fuel lines, plugged fuel injectors and quickly worn pistons. These engine wear problems have prompted the manufacturer to replace every piston on every bus after only two years of operation.

Metro's methanol buses are also 940 pounds heavier than a comparable diesel bus when fully loaded. Compressed natural gas and diesel trap oxidizers would also add considerable weight, so this is not a problem unique to methanol. We are concerned, however, about potential conflicts between federal clean air and federal axle load limits. Federal financed research should proceed on lighter weight buses to help achieve clean air and other goals.

During 1988, Metro's methanol buses costs 45% more to operate than their diesel counterparts. In the current Seattle market methanol fuel costs three and one half times more than diesel fuel on an equivalent mile basis. Bus parts, repair labor and other material and supplies are also included in the 45% costs premium figure.

The transit industry's experience with methanol engine technology suggests that further demonstrations and refinements are necessary before mass production is mandated by the federal government. Today's high costs and low reliability should improve greatly over the next five to ten years as the technology matures, but methanol has not yet proven itself worthy of special consideration in the Clean Air Act.

Let meturn to the question of "clean" diesel fuel. Research studies conducted by the Environmental Protection Agency (EPA) and others suggest diesel emissions cause or contribute to non-cancerous respiratory illnesses. I believe the Environmental Protection Agency's goal of reducing the permissible level of fine particulate diesel emissions from buses and trucks to .1 grams per brake horse power per hour is appropriate. This six-fold reduction will give the bus riding public and other urban residents an extra margin of breathing safety. Complementary regulations reducing the sulfur content of diesel fuel are particularly important since sulfur dioxide and sulfuric acid appear to be the clearest contributors to health risks from diesel exhaust.

But diesel bus exhaust is a very small contributor to ambient particulate matter air quality problems. In the Puget Sound area, federal particulate matter standards are violated in the Duwamish and Kent industrial areas and the Tacoma tide flats. By contrast, downtown Seattle with its high volumes of slow moving diesel buses does not violate federal standards. Furthermore, local and state air quality attainment implementation plans focus on wood stoves, unpaved streets and stationary sources rather than the transportation sector as the most productive sources of particulate matter control.

The net air quality benefits of shifting urban transit buses entirely away from diesel may also be minimal. While the health effects of diesel have been studied extensively, much less is known about the health affects of methanol emissions. Research by the Argonne National Laboratory[1] noted potential increases in aldehyde emissions from methanol engines lacking after burn catalytic converters. That same study suggested the environmental benefits from methanol buses in central business districts may be less than expected because of methanol's poor ignition properties at idle and low load.

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[1] "Environmental Quality Changes Arising from the Replacement of Diesel Oil-Fueled by Methanol-Buses." D.J. Santini, C.L. Sarricks & R. Sekar.

In light of the soon to be realized environmental improvements in diesel engines and the limited experience with methanol technology, Seattle Metro joins the others in the transit industry in calling for fuel neutral performance-based emissions standards. Such standards should include the 1994 EPA fine particulate matter standard of .1g/bhp/hr. Since this technology is not currently available on a reliable basis for any type of fuel, a phase-in period is also recommended.

Finally, in my role as chairman of a transit authority, let me explain why I think the transit industry should not be singled out for particularly costly federal clean air mandates. Outside of central business districts in our major metropolitan areas, public transportation is an insignificant source of urban air pollution. Even in central business districts, transit's air quality impact is, on the whole, positive. Carbon monoxide pollution is a much greater problem than particulate matter pollution in most large cities. Since the automobile is by far the principal source of carbon monoxide, environmental actions that disproportionately increase the cost of providing transit service may actually increase the carbon monoxide pollution problem. In our area, the average diesel bus transit commuter's trip generated only 4% of the carbon monoxide produced by a single occupant auto commuter.

Furthermore, recent experience suggests that heavy duty engine manufacturers will not invest the resources necessary for major technological breakthroughs for the urban transit industry unless the trucking industry is subject to the same requirements. Roughly 3,000 new engines are built each year for the U.S. transit industry compared to one million engines for the U.S. trucking industry.

Federal Clean Air Act legislation should recognize transit's positive contribution to reducing urban air pollution. Incentives should be included to reduce increased use of single occupant automobiles. H.R. 99 introduced last year by Congressman Al Swift of Washington state contains provisions aimed at reducing vehicle miles traveled and providing guidance to states on environmentally sound transportation alternatives. S. 1630 introduced by you, Mr. Chairman, contains extensive and precise transportation control measures which, if incorporated into your clean air efforts, will go far to level the playing field between single occupant auto use and more environmentally sensitive use of multi-passenger mass transit vehicles.

Unfortunately, provisions of the federal tax code actually promote automobile use in large cities at the expense of transit. Parking is considered a tax-free "condition of employment" regardless of its value.

Meanwhile, employer contributions to transit and vanpool passes are considered a "de minimus" fringe benefit that becomes fully taxable if it exceeds $15.00 per month.

In conclusion, Mr. Chairman, let me reiterate my three main points:

(1) Methanol is a fuel whose day may come but has not yet arrived.

(2) Diesel fuel should be considered a "clean" fuel at EPA's new .1 gram/brake horse power/hour standard.

(3) Urban transit clean air requirements should be viewed in the context of similar requirements for automobiles and trucks.

Thank you for giving me this opportunity to share my views. I would be happy to answer any questions.

Before the
Committee on Environment and Public Works
of the
United States Senate

Statement of the
American Car Rental Association

Regarding alternative fuels

January 11, 1990

The American Car Rental Association ("ACRA") is a voluntary, non-profit national trade association composed of approximately 500 corporate franchisors, licensees, franchisees, and independent operators engaged in the renting and leasing of vehicles on a short term basis.

ACRA is concerned about certain proposals to reauthorize the Clean Air Act which would establish alternative fuel programs requiring operators of vehicle fleets to incorporate into their fleets a specified percentage of vehicles capable of using alternative fuels. Applying these requirements to vehicle fleets operated by car rental companies would be inappropriate, is infeasible, and would have an adverse impact on car rental consumers and the car rental industry.

Car Rental Fleets Are Not "True Fleets"

Groups of vehicles commonly considered fleets (e.g., utility vehicles, repair vehicles, delivery vehicles, taxis, buses, and government vehicles) typically are owned and operated by one entity, driven by the same driver, driven over short distances, and fueled and serviced at central facilities or at specific identifiable locations. Because of these characteristics, such fleets can be considered "true fleets" and are very suitable for utilizing alternative fuels.

Car rental fleets, however, do not possess the closed, controlled "environments" associated with "true fleets" and which are necessary for the initial implementation of alternative-fuel technology. Rental vehicles are driven by numerous individuals who likely will not be familiar with the operational characteristics of the alternative-fuel cars. Sixty percent of the cars rented are not refueled centrally at the car rental company's facilities. Rather, customers typically purchase fuel at service stations and other retail outlets. Few, if any, of these off-site outlets would offer alternative fuels because of market forces. Moreover, many of the vehicles are driven over long distances. Thus, without an extensive system of distribution of and access to alternative-fuels, renters of alternative fuel vehicles would be required to return to the rental site or another facility operated by the car rental company to refuel, thereby significantly limiting the customer's travel radius.

The Alternative Fuel Provisions Place Severe Burdens On Car Rental Consumers

In addition to the lack of a system of nationwide access to alternative fuels, no support system is in place for maintaining, repairing and supplying parts and equipment for alternative- fuel vehicles car rental companies would have to purchase. A malfunctioning alternative-fuel vehicle would leave the customer "stranded."

Moreover, the choice and range of vehicles available to meet customers' needs and the economic considerations of car rental companies would be severely limited. A wide selection of alternative fuel vehicles to meet customer demands simply is not available. Further, there are clearly identified peak demand periods during the year when car rental companies acquire vehicles on a short-term basis from manufacturers. The cars are immediately returned after these periods to the manufacturers. Given the competitive nature of the car rental industry, those companies subject to the alternative-fuel requirement would be at a disadvantage because of their inability to amortize the alternative-fuel retrofit costs for these peak-demand vehicles over the time they hold them.

The Alternative Fuel Provisions Place Severe Operational And Economic Burdens On The Car Rental Industry

The alternative fuel provisions apply to fleets in certain nonattainment areas. A high percentage of alternative fuel vehicles may be driven to and/or returned to an attainment area where alternative fuels are not required and not available. Similarly, traditional fuel vehicles may be driven to and/or returned to nonattainment areas. Car rental companies would face enormous costs and planning difficulties in transferring alternative fuel vehicles from one area to another to meet customer demand and the percentages specified in the proposals.

In addition, car rental companies will be required to expend significant amounts of money to equip vehicles with an alternative fuels system. Moreover, rental car companies hold vehicles for only a short period of time and then dispose of the vehicles. The economic success of the company is tied to the companys' ability to dispose of surplus vehicles at reasonable prices and in an efficient and timely manner as possible. Given the almost nonexistent demand for alternative fuel vehicles, the after-market value of these alternative fuel vehicles will be drastically reduced.

Health And Safety Concerns Have Not Been Addressed

While alternative fuels, such as neat methanol, generally reduce hyrocarbon emissions, many persons have voiced concerns with the health and safety effects of such fuels. For example, methanol poses many toxicological issues. Further, despite new Federal underground storage tank regulations to prevent, detect, and minimize tank leaks, releases of methanol into groundwater could create a widespread environmental "nightmare" and could expose tank owners and operators to substantial costs and liabilities.

For these reasons, ACRA encourages the Senate to adopt language from H.R. 3030 reported by House Energy and Commerce Subcommittee on Health and the Environment which exempts car rental fleets from the fleet requirements contained in the bill's alternative fuels program.

Statement Submitted to the Senate Committee on Environment and Public Works

Subcommittee on Environmental Protection

January 23, 1990

This statement is submitted on behalf of the Southern California Edison Company (SCE), the Los Angeles Department of Water and Power (LADWP), the Edison Electric Institute (EEI) and the American Public Power Association (APPA). For several months SCE, LADWP, EEI, APPA and others have worked to increase public awareness and understanding of the benefits of electricity as a transportation fuel. The specific focus of this statement is on the important benefits that the use of electric vehicles (EVs) could produce, including significant environmental benefits. We will also suggest policies that should be adopted to effectively encourage the development and commercialization of this important emerging technology as part of any legislative effort to encourage alternative fuels.

The Electric Utility Industry's Support for Electric Vehicles

Efforts directed particularly at encouraging the use of electric vehicles are already underway in many areas. For example, the California Electric Vehicle Task Force is actively seeking to promote EV commercialization in California. The Task Force was created in 1988, and includes representatives from state agencies, including the Air Resources Board, Air Quality

Management Districts, the California Energy Commission, and the California Public Utilities Commission as well as utilities to bring a balanced perspective to policymaking concerning the role that electric vehicles have in California's transportation future. The Task Force is charged with advancing the development of EV technologies, with particular emphasis on selected research, development and demonstration efforts. Most recently, the Task Force has endorsed "A California Plan for the Commercialization of Electric Vehicles." This plan sets forth the first set of specific actions and associated funding needs for commercializing electric vehicles over the next ten years.

One other important effort to encourage the introduction of electric vehicles is known as the Los Angeles Initiative, a joint request for proposals developed by the LADWP, other Los Angeles City Offices and SCE. The Initiative sought proposals from manufacturers to introduce 10,000 electric vans, trucks and passenger cars to the South Coast Air Basin by 1995. In November, 1989, three companies -- Unique Mobility, Vehma and Clean Air Transport -- were selected for contract negotiation. Unique Mobility plans to introduce minivans into the Basin, while Vehma would produce full-size vans (the Electric G-Van). Clean Air Transport proposes 4-passenger EVs and quarter ton micro pickups or vans, using a purpose-built platform (vehicle body).

Several concerns and interests motivate the electric utility industry's support for EVs. Widespread use of electric vehicles would provide a market opportunity for off-peak power sales. Since electric vehicles would be recharged primarily during the overnight hours of nonpeak use of electricity, more efficient utilization of electrical generating capacity would be achieved.

But it is not solely this prospect of load levelling that attracts the electric utility industry to this technology. Several utilities have participated in the development and proof-of-concept of today's EV technologies, in part through the Site Operators User Task Force of the Department of Energy's Electric and Hybrid Vehicles Program. Electric utilities are expected to be among the initial purchasers and users of electric vehicles when commercial production is initiated.

The utility industry as a whole has already made a substantial financial commitment to electric vehicles. SCE has purchased 15 pre-production models of the most advanced electric vehicle technology now available, the Electric G-Van; LADWP has acquired 6 of these same vehicles, and plans are being developed within the electric utility industry for the purchase of several hundred more G-Vans. In the coming months, utilities will be demonstrating Electric G-Vans to interested fleet buyers, and loaning the vehicles to fleet operators for testing in day-to-day operations.

We will continue our efforts to develop and promote electricity as a transportation fuel. We are convinced that the use of electricity as a transportation fuel must play a major role in resolving the nation's long term concerns about pollution from mobile sources. The industry believes that public policy should embrace increased reliance on EV technology as an effective means to attaining air quality standards, particularly in urban areas.

Environmental Benefits of Widespread Electric Vehicle Use

Emissions from roadway vehicles -- cars, trucks and buses -- have been identified as a primary cause of non-attainment of air quality standards for ozone and carbon monoxide. While many advances have been made in reducing emissions from internal combustion engine (ICE) vehicles, it is clear that other approaches must be developed if mobile source pollution is to be significantly reduced. Vehicle miles travelled are on the increase, producing increased emissions despite past technical advances, along with associated problems of traffic congestion, wear and tear on the roadways and noise pollution.

Renewed commitments to attaining ozone and carbon monoxide standards create new opportunities for clean-fueled transportation alternatives. Electric vehicles must play a central role in any program designed to address emissions from mobile sources because they are the single most effective means of reducing transportation sector emissions.

The California Air Resources Board (CARB) has published emission rates for several alternative fuels -- electricity, methanol, compressed natural gas (CNG) and liquid petroleum gas

(LPG) -- and comparisons of the emissions produced by alternatively-fueled vehicles to those of gasoline-powered vehicles in three categories -- reactive organic gases (ROG), carbon monoxide and nitrogen oxides. The CARB results factor in the incremental emissions attributable to generating the electricity required to recharge the electric vehicles. The results demonstrate that of the relatively near-term alternatives to conventional gasoline powered vehicles, EVs not only offer the greatest reduction in emissions when compared to gasoline-powered vehicles, but are virtually emission free during operation and therefore are by far the lowest emission alternatively-fueled vehicles.

As illustrated in Attachment 1, when compared to gasoline-fueled vehicles, electric vehicles are 64 times better in terms of emissions of reactive organic gases, 174 times better in terms of carbon monoxide emissions and 8 times better in terms of oxides of nitrogen emissions. The CARB figures also demonstrate how much lower EV emissions are than those of other alternatively fueled vehicles. For example, in ROG emissions, EVs are 55 times better than methanol, 32 times better than LPG and 30 times better than CNG.

Attachment 2 illustrates the reduction in emissions that can be anticipated by the replacement of gasoline-powered vehicles with EVs. According to the Electric Power Research Institute (EPRI), for every one percent of the registered vehicles in this country replaced with EVs, urban air emissions would be reduced by 160,000 tons per year. This figure does not take into consideration reductions in carbon dioxide emissions that would also result. In California, for example, generating the electricity needed to recharge EV batteries would produce approximately 70 percent less CO_2 than would the continued use of gasoline-powered vehicles. (Source: EPRI Technical Brief, "Electric Van and Gasoline Van Emissions," 1989.) The impact on CO_2 emissions produced by increased EV use would be especially significant if the electricity used to recharge vehicle batteries is produced from renewable sources or nuclear power.

EVs also run far more quietly than ICE vehicles, a significant consideration in areas where noise pollution resulting from heavy vehicle usage is an issue. EVs are more efficient in their use of their power supply than gasoline-powered ICE vehicles. The EPRI emissions survey also demonstrates that a full sized electric van is expected to be 25 percent more efficient in fuel consumption than a similarly sized gasoline-powered van. The improvement is even more dramatic when minivans are compared: an electric minivan is estimated to be 40 percent more efficient than a similar gasoline-powered vehicle.

Energy Security Benefits of Widespread Electric Vehicle Use

Another public policy factor to be considered in designing programs to encourage the use of alternative fuels is the impact that fuel choice has on our national energy security. As U.S. demand for oil is increasing, so is our national dependence on imported oil. The transportation sector now consumes 60 percent of the oil used in this country. Thus the selection of alternatives to conventional motor vehicle fuel also offers an opportunity to address the growing dependency on imported oil.

What is more, the financial impact of increasing our reliance on foreign imports is substantial. Oil imports now account for an estimated one-quarter of the U.S. balance of trade deficit.

Replacement of gasoline-powered vehicles with EVs could displace large amounts of imported oil. According to EPRI, substitution of electric vehicles for each one percent of the 200 million vehicles currently registered in this country would save approximately 35 million barrels of oil per year and reduce our trade deficit by $1 billion annually.

Electricity also has the advantage of being generated primarily using a mix of domestic resources. The substitution of conventionally-fueled vehicles with electric vehicles thus offers one important means of insulating the national economy from the shocks occasioned by any disruption in the oil marketplace.

State Alternative Fuels Programs To Address Air Quality Concerns

On the state government level, the State of California has been among the leaders in developing a clean fuel vehicle program to address air quality concerns. It is important to acknowledge the central role that electric vehicles are projected to play in California's program.

As the Subcommittee is aware, the South Coast Air Quality Management District (AQMD) in southern California has proposed a plan that, once fully approved, would be implemented in three stages ("tiers"). Full implementation of already known control technologies is to take place over a five year time frame (Tier I). As part of this measure, new requirements for the purchase of "low emission" vehicles are being drafted to affect light duty fleet vehicles as early as 1993.

In Tier II of the AQMD plan, significant advancement of today's technologies will be required over the next ten years. Use of low emission vehicles will be mandated for 40 percent of all passenger vehicles, 70 percent of all freight vehicles and for 100 percent of transit vehicles currently powered by diesel fuel. The AQMD's assumption is that to meet the air quality requirements established for Tier II, 50 percent of all the newly introduced low emission passenger vehicles called for under the plan will have to be electric vehicles: that is, 1.7 million EVs in California alone by the year 2000. Meeting this target will require the production and sale of 350,000 EVs per year in the period 1995-2000.

In Tier III, technological breakthroughs occurring over the next twenty years will be relied upon to require conversion of all vehicles to "extremely low emission fuels" which produce no tailpipe emissions. At the present time, electric vehicles are the only vehicles that would satisfy this "extremely low emission fuels" requirement. Again, the AQMD's underlying assumption is that to achieve Tier III requirements will require at least 70 percent of the new extremely low emission passenger vehicles to be electric vehicles: a total of 6.7 million EVs in California by the year 2010. The production and sale of 500,000 vehicles on average will be required in each year between 2001 and 2010 to meet this target. It is understood that full compliance with the AQMD plan may ultimately require an all-electric transportation system in the 21st Century.

Electric Vehicles in National Clean Fuels Efforts

In some senses, the California program may serve as a model for other states in developing air quality attainment programs. The California program's emphasis on electric vehicles must also be reflected in clean fuel vehicle programs at the federal level.

Major legislative proposals under consideration in the context of the Clean Air Act debate recognize that converting to clean-fueled alternatives from gasoline-powered vehicles is central to attaining air quality standards, particularly in urban areas. Differing approaches have been offered to address the need to get more clean-fueled vehicles on the road, particularly in severe non-attainment areas of the country. Some of the approaches mentioned range from the President's proposal to progressively introduce clean-fueled vehicles in ever increasing numbers in the period between model years 1995 and 2004, to legislation to establish requirements for sales of certain minimum percentages of low-emission vehicles using clean fuels to serve as a baseline for air quality compliance strategies in severely polluted areas. On the road performance testing of alternatively fueled vehicles, with a specific program for the Los Angeles area and an expanded clean fuel program beginning in 1997, is also under discussion as a possible amendment to S. 1630, pending Senate clean air legislation.

It is imperative that any alternative fuels programs that may be adopted by the Congress treat electric vehicles fairly. As a matter of federal policy, we should not rule out _any_ of the alternative clean fuel vehicles currently under discussion, or place any additional obstacles in the way of their development. What is more, appropriate incentives to assure that a full range of alternatively fueled vehicles are available should be developed.

Existing Barriers To Commercialization Of Electric Vehicles

Despite years of technology development efforts, _e.g._, efforts concentrating substantial public and private resources on battery research, development and improvement, electric vehicles for highway use are not commercially available today. A number of barriers that prevent this technology from reaching its full potential can be identified. Some of these barriers are market-based while others are technical. Some barriers may be regulatory, and still others may best be characterized as "public relations" problems. Congress should take the initiative now to augment efforts already underway in various states and within the private sector to advance the prospects for electric vehicle use.

Market-Based Barriers To Electric Vehicles

The convergence of energy and environmental issues in the growing national debate on clean air presents an important opportunity for electric vehicles. The most logical introductory niche markets for EVs are in those urban areas of the country where attainment of air quality standards is most difficult, where the environmental benefits of EVs would have the greatest impact, and where the operational limits of EVs are acceptable. Replacement cycles and procurement practices provide a means to introduce EVs into existing fleets as older conventionally-powered vehicles are retired without disruption to the overall fleet. Because of their low maintenance requirements and low energy costs, EVs present an attractive alternative to currently available fleet vehicles.

Today, no market-driven demand for electric vehicles exists. Two factors that hamper the development of an EV market are high initial vehicle cost and inability to evaluate EV performance in actual driving conditions. Moreover, certain infrastructure issues also remain to be resolved if an EV marketplace is to develop.

- High purchase price: To date potential EV manufacturers and fabricators have been unwilling to make the investments necessary in facilities for the high-volume production of electric vehicles without stronger indications of consumer demand for EVs. As a result, only a few proof of concept or prototype vehicles have been made available in this country. The lack of production facilities has kept the per vehicle cost high compared to comparable gasoline-powered vehicles. Without volume production, which is expected to achieve significant economies of scale and thereby lower costs, consumers will resist paying the high purchase price per vehicle.
- Lack of experience with EV performance: Without volume production, consumers are unable to evaluate the performance of EVs in actual on-the-road-use, and are unwilling to commit to the use of a large number of EVs until they are satisfied that EV performance characteristics are acceptable and that the vehicles will be cost competitive on a life cycle basis with conventionally-fueled vehicles.
- Infrastructure issues: Supporting the introduction of a new vehicle technology will require a number of consumer service-oriented steps. Creation of an initial distribution network is required, and must be carefully planned to assure

that EVs are available in those areas of the country where they can make the largest contribution to attaining air quality standards. Although EV maintenance costs are expected to be substantially less than those of conventional vehicles, service networks still will need to be established. Also, provisions for recharging need to be developed, in conjunction with the electric utility industry. Given the existing electricity distribution infrastructure, providing for recharging is not expected to be a significant burden.

- Need for major industrial support: Successful development of a domestic EV manufacturing capability will require the active involvement of major automotive manufacturers that possess the ability to offer system engineering and safety and reliability testing. Some of the smaller entities that have traditionally been at the forefront of EV development efforts have not had the capability to provide these services. Today, however, there is active involvement in the electric vehicle development program by General Motors, Vehma, Chrysler and Ford, through the Department of Energy electric vehicle program, and other major component manufacturers. GM's recent announcement that it has designed a prototype two passenger EV has generated considerable excitement. The fact remains, however, that no major automaker has announced any plans to actually produce EVs, although the increased level of interest certainly illustrates the opportunity to proceed with commercialization initiatives at this time. Realizing this opportunity, however, requires support for the creation of an EV market.

Technical Barriers To Electric Vehicles

Much of the unrealized promise of the electric vehicle development programs of the 1970's and early 1980's may be attributed to the continuing need for electrical drivetrain improvements. EV supporters concede that performance improvements are needed, particularly with regard to battery development. Nevertheless, public policymakers at all levels must recognize that proven EV technology is available, and that millions of miles have been driven in electric vehicles all over the world.

The task facing us now is to get the available technology on the road -- to build a performance history that will convince consumers and manufacturers alike of the benefits of EVs and to identify areas where technological improvements would have the most impact.

- Technical limitations on vehicle range: The electric vehicles closest to the point of commercialization today are powered by conventional lead-acid batteries. While the lead-acid battery configuration has been shown to be highly reliable, the battery pack must be periodically replaced during the life of the EV, which significantly affects the life cycle cost of the vehicle. With the lead-acid technology, a full sized electric van has been designed, is in prototype production, and is nearing the completion of Federal Motor Vehicle Safety Standards (FMVSS) tests. Current EVs powered by lead-acid batteries are capable of a 60 mile range between recharging, which is suitable for many urban fleet applications. In fact, as many as 40 percent of commercial light duty fleet vehicles in major urban areas travel only 60 miles in any given work day. However, near term technology, _i.e._, technology expected to be available within the next five years, will rely on nickel-iron and sodium sulfur batteries, that will increase the projected electric vehicle range to as much as 200 miles between recharges. Such a range can meet the daily needs of the vast majority of drivers of passenger cars and light duty vans and trucks in the United States. Early electric vehicles equipped with lead-acid batteries can be refitted with advanced batteries when they become available. Nevertheless, the existing limitations on vehicle range make it essential that an initial niche market -- urban fleets -- be developed for the introduction of EVs, and that improvements in vehicle range be achieved before EV technology will be acceptable to a broad spectrum of consumers.

- Other performance concerns arising from the need for improved battery technologies: Improvements in battery technology resulting in improvements in vehicle performance are essential to the ultimate commercial acceptance of electric vehicles. Increased investment in battery R&D is required. Yet investment in battery research is effectively stymied today by the lack of commercial prospects for electric vehicles. An important outgrowth of developing an EV market would be the creation of an outlet for improved EV battery products. Then a market-driven mechanism would exist to pull private R&D funds into battery research, and thereby advance the time when enhanced battery technologies will be commercially available.
- Further technical advances: Improvements in power electronics, concentrating on improved power trains and power drive will add to the reliability of the electric vehicle and improve its efficiency. Other applications being developed, such as "smart circuits" could have wider applicability in electric utility delivery systems. The use of alternate power units (APUs) to recharge batteries during vehicle operation could also significantly extend the vehicle range per charge.

Regulatory Barriers

Under the Alternative Motor Fuels Act of 1988, an interagency study of regulatory barriers to electric vehicles is underway. We are hopeful that the final study report, including recommendations for additional regulatory incentives, will be sent to Congress shortly. We are awaiting the release of the study and will review it carefully to identify important opportunities for action, and to urge that Congress move promptly to consider any necessary legislative responses.

Administrative or regulatory programs that favor one fuel type over others or fail to provide for adequate consideration of all feasible alternatives are of great concern. The Department of Energy has recently announced the private/local government membership on the United States Alternative Fuels Council, a new body set up to advise an interagency commission on alternative fuels. We hope to work with the Council to assure that the alternative of using electricity as a transportation fuel will be adequately considered in the Council's deliberations.

In our own examination of existing regulatory barriers, we have found instances of a lack of equal treatment of incentives offered, for example, to alcohol fuels but not to electric vehicles. It will be important to emphasize the need for an improved regulatory playing field for electric vehicles, so that their development is not artificially impeded by lack of incentives or outright regulatory barriers. We look forward to a thorough analysis of the regulatory framework at the federal government level that will provide the basis for the development of further policies to encourage electric vehicle development.

The "Perception" Barrier

When electric utility industry representatives have discussed EVs and the use of electricity as a transportation fuel with federal and state officials, it is clear that electric vehicles are fundamentally misunderstood. Currently available technology -- the Electric G-Van -- is a full-sized van capable of transporting passengers or cargo. Electric G-Vans come equipped with automatic transmissions, power steering and air conditioning. A description of the G-Van is presented in Attachment 3.

Unfortunately, when people think of EVs, the image produced is one of golf carts, or perhaps the triangular, one-passenger commuter cars seen in the late 1970's in some of our cities. The industry has moved far beyond those fledgling attempts, but some of the past problems encountered with the early technologies still seem to overshadow efforts to encourage wider use of much-improved EV technologies today. We still find that in the list of alternative vehicle fuels, electricity is often given little recognition or omitted entirely, despite its comparative benefits vis-a-vis other fuels.

Recommendations for Policies to Encourage Electricity as an Alternative Fuel

It is very important for the federal government to send a strong signal that EV technology is important and worthy of public and private sector interest, involvement and investment. Any alternative fuels program that may be adopted by the Congress must include electric vehicles. Congress should also adopt an initiative to facilitate the early introduction of electric vehicles into commercial use. Such an initiative would serve both as a means to lessen the air quality impacts of the transportation sector and to reduce our national reliance on imported petroleum.

The advantages of EVs described above -- their contribution to a cleaner environment and greater national and economic security derived from greater energy security -- currently relate more to "general public benefits" than to benefits likely to be realized by individual consumers of electric vehicles. Unless or until consumers are convinced that the product meets their individual needs, or until public policy dictates a change in consumer habits, EVs, despite their public benefits, are not likely to displace conventionally-fueled vehicles. The imposition of regulatory mandates to encourage alternative vehicles standing alone may not be sufficient to overcome the market based obstacles to EVs. It is significant that in California where the regulatory pressures to consider alternative fuels are among the most far-reaching in the nation, the

California EV Task Force's commercialization plan acknowledges that market development incentives are extremely important.

As increasing emphasis is placed on attaining air quality standards, the anticipated changes in environmental policy are likely to influence consumer choices for transportation. Those alternately fueled vehicles that best meet consumer preferences and are most able to cost-effectively comply with new public policy dictates will have the best chance of market acceptance. The benefits of EVs -- the technology most consistent with the need to reduce mobile source emissions; the technology able to provide the most direct and effective means to cutting transportation sector emissions -- cannot be realized soon unless consumer acceptance is also addressed and accelerated.

Commercial applications of EVs in actual driving conditions will demonstrate the capabilities of the technology, thereby increasing consumer acceptance and making real progress toward the ultimate goal of commercialization. In light of the rapidly changing focus of public policy toward achieving the air quality objectives of the Clean Air Act, and to insure that EVs are available to achieve those goals, the federal policy focus should be expanded to address the obstacles to widespread commercial use of EVs.

The type of initiative needed to address the problems of EV commercialization has a parallel in the automotive industry: "seeding" the market with a new product. Through "seeding," the market is shown the product, enabling consumers to become familiar with it and leading to improvements in the product. For electric vehicles, a multi-year, federally funded production incentive program is needed. Such a program would send a clear signal to the marketplace -- EV producers and potential consumers -- that this nation recognizes electric vehicle technology development and demonstration as a key element of energy and environmental policy. The magnitude of the benefits offered make it appropriate to devote public funds -- properly leveraged by substantial private commitment -- to an electric vehicle commercialization program.

Federal efforts to support EV commercialization should include, at a minimum:

- A requirement for vehicle purchase cost sharing between private and public sector participants, with limitations on the percentage of the per vehicle cost that may be paid by federal funds;
- A program targeted to those non-attainment areas with the most significant need for air quality improvement;
- An effort directed not to ultimate purchasers but to potential manufacturers, in order to develop a continuing manufacturing capability and to address directly the problem of high initial electric vehicle cost. Responsibility for marketing the EV product should be the vehicle manufacturer's, not the government's;

- Administration of the program through the Department of Energy, building on its established expertise, with appropriate consultation with the Departments of Transportation and Commerce and the EPA;
- A multi-year program duration, to provide stability in the program and to permit the integration of advanced battery technologies and other technology improvements into a commercially acceptable vehicle or vehicles; and
- An ultimate goal of driving down the cost of EVs, calculated on a life cycle basis, to be on a parity with the life cycle costs of a comparable conventionally fueled vehicle.

Conclusion

Electric vehicles can provide convenient transportation in an environmentally acceptable manner. The emissions reductions that can be achieved by substituting electric vehicles for conventionally-fueled vehicles are significant. As shown in Attachment 4, electric vehicles emit 98 percent less reactive hydrocarbons, 89 percent less NO_x and 99 percent less CO than gasoline powered vehicles. Electric vehicles have the associated benefit of offering an important means to reduce our growing national dependence on unstable supplies of imported petroleum.

Action at the federal government level is necessary to assure that the benefits of electric vehicles are realized in the near term. High per vehicle costs, as well as lack of actual on-the-road driving experience, have kept the demand for electric vehicles far below the level necessary to justify manufacturers' investment in production facilities. Without carefully designed incentives, EVs will continue to be produced in only very small numbers at prohibitive costs.

The federal government can and should assume a leadership role in encouraging electric vehicle production and technology advancement to assure that the environmental and energy security benefits of EVs will be achieved. We urge that this principle be reflected in the development of alternative clean fuels programs to be considered by Congress.

California Air Resources Board
1989 Emission Comparison

Grams/Mile Emission Results

1989 California Air Resources Board Report

Vehicle Type	Reactive HC			*CO*	*NOX*
	Total	*Exhaust*	*Evaporative*		
Gasoline	0.39 *Electric is 64 times better*	0.35 *Electric is 57 times better*	0.04	1.40 *Electric is 174 times better*	0.66 *Electric is 8 times better*
Methanol	0.34 *Electric is 56 times better*	0.25 *Electric is 40 times better*	0.09	1.00 *Electric is 124 times better*	0.45 *Electric is 5 times better*
LPG	0.20 *Electric is 32 times better*	0.20 *Electric is 32 times better*	0	1.40 *Electric is 174 times better*	0.27 *Electric is 3 times better*
CNG	0.19 *Electric is 30 times better*	0.19 *Electric is 30 times better*	0	0.10 *Electric is 11 times better*	0.44 *Electric is 5 times better*
Electricity	0.006	0.006	0	0.008	0.07

Source: California Air Resources Board, Mobile Source Division, Definition of a Low-Emission Motor Vehicle in Compliance with the Mandates of Health and Safety Code Section 39037.05, May 1989.
These emission reduction calculations do not reflect CARB's ozone reactivity factors.

Method used to calculate times better numbers:
Times better is the difference between the two emission results divided by electric's emission results.
For example gasoline total Reactive HC vs. electric total Reactive HC is (.39 - .006) / .006 = 64

ATTACHMENT 1

California Air Resources Board
1989 Emission Comparison
Tons/Year Emission Results
1989 California Air Resources Board Report

Single Vehicle at 20,000 miles/year	Total Reactive HC (Pounds)	CO (Pounds)	NOx (Pounds)	Total Pollutants (Pounds)
Gasoline Powered	17.181	61.674	29.075	107.93
Electric	.264	.352	3.084	3.70

1000 Vehicle Fleet at 15,000 miles/year	Total Reactive HC (Tons)	CO (Tons)	NOx (Tons)	Total Pollutants (Tons)
Gasoline Powered	6.443	23.130	10.905	40.478
Electric	.099	.132	1.157	1.388
Total Pollutants Reduced	6.344	22.99	9.74	39.09
Percent Reduced	99%	99%	89%	97%

Source: California Air Resources Board, Mobile Source Division, Definition of a Low-Emission Motor Vehicle in Compliance with the Mandates of Health and Safety Code Section 39037.05, May 1989.

ATTACHMENT 2

Facts and figures about the G-Van

SPECIFICATIONS OF THE G-VAN	
Chassis frame	Integral construction
Front suspension	Independent, upper and lower control arms
Rear suspension	Leaf-springs
Rear axle	4.10:1 ratio
Shock absorbers	Piston-type, double acting, front and rear
Power steering	1.5 hp, 210-volt DC electric motor-driven hydraulic pump
Power brakes	12-volt DC electric motor-driven vacuum pump
Wheels	8 studs
Tires	8.75R 16.5lt, General Radials
Motor	216-volt DC, 42kW (52hp)
Battery	216 volt, 205 ampere-hours (5-hour rate), tubular lead-acid
Transmission	Chain and sprocket—one speed gearset
Auxiliary Battery	115 minute reserve, 540 cold-cranking amps
Heater	Diesel fuel
Off-board charger	200-250-volt, 35 amps, 60 Hz

DIMENSIONS (in inches)	
Wheelbase	125
Overall length	202
Overall width	79
Overall width with mirrors	90
Overall height	82
Ground clearance to battery tray	7
Front tread	75
Rear tread	78
Interior height	46
Interior width at floor	70
Wheelhouse length	36
Width between wheelhouses	60
Rear doors (usable opening)	54
Cargo area length	113
Cargo area volume (cubic feet)	256

WEIGHTS (in pounds)	Cargo	Passenger
Gross vehicle weight	8,600	8.600
Payload	1,800	1,450
Curb weight	6,800	7,150

PRELIMINARY PERFORMANCE DATA	
Range: 35 mph constant speed Simulated city driving	90 mi 60 mi
Top speed	53 mph
Acceleration time (0–30 mph)	12 sec
AC energy consumption	1.0kWh/mi
Stopping distance from: 30 mph 50 mph	 52 ft 168 ft

ATTACHMENT 3

Air Quality Improvement Potential of Alternate Clean Fuel Vehicles

% Emissions Reduction Compared to Gasoline

Alternate Clean Fuel Vehicle (Passenger)	Reactive HC		*CO*	*NOX*
	Total	*Exhaust*		
Electric	98% less	98% less	99% less	89% less
CNG	51% less	46% less	93% less	33% less
LPG	48% less	43 % less	Same	59 % less
Methanol	13% less	29% less	29% less	32% less

Source: California Air Resources Board, Mobile Source Division, Definition of a Low-Emission Motor Vehicle in Compliance with the Mandates of Health and Safety Code Section 39037.05, May 1989.

ATTACHMENT 4

PHH Corporation
Samuel H. Wright
Vice President
Government Relations
11333 McCormick Road
Hunt Valley, MD 21031
Telephone
301 771 2471

PHH

January 17, 1990

The Honorable Max Baucus
Chairman, Subcommittee on
Environmental Protection
and
The Honorable John H. Chafee
Ranking Member, Committee on
Environment and Public Works
United States Senate
458 Dirksen Senate Office Building
Washington, D.C. 20510

Re: Alternative Fuels

Dear Senators Baucus and Chafee:

PHH Corporation, founded in 1946 and located in Hunt Valley, Maryland, leases and/or manages approximately 312,000 vehicles to large and small businesses throughout the Nation through its subsidiaries PHH FleetAmerica Corporation and Avis Leasing Corporation. PHH is a publicly-held corporation with its stock traded on the New York, Toronto and London exchanges. PHH is a member of the American Automotive Leasing Association, whose members lease over 2 million vehicles.

Thank you for your invitation dated January 8, 1990 to submit written testimony to be included in the hearing record with respect to the hearing held by the Subcommittee on Environmental Protection on January 11, 1990.

PHH has two principle concerns that it believes are worthy of the attention of the members of the Environmental Protection Subcommittee. The first concern is that any proposal that imposes obligations on fleets to use alternative fuels be limited to centrally-fueled and centrally-garaged vehicles. The second concern is that the definition of the terms "fleet" or "fleet operator" should only include the actual operators of the vehicle.

Based upon my understanding of the fleet provisions contained in Senator Chafee's "Alternative Fuels Proposal" dated January 5, 1990, the fleet provisions apply only to operators of centrally-fueled and centrally-maintained fleets. PHH believes this is the preferable approach.

If alternative fuel proposals applied to all fleets, PHH maintains that the goals of the Clean Air Act with respect to these vehicles would be frustrated, while, at the same time, the domestic motor vehicle industry would be injured. As a general matter, commercially used fleets of vehicles that are not centrally-fueled or centrally-garaged are: 1)assigned to sales and service employees, 2) consist primarily of passenger automobiles, light duty vans and light duty trucks and 3) are generally dispersed throughout the country or region. Vehicles in such fleets are assigned to drivers who call upon accounts in a relatively large geographic area. These geographic areas may include all or part of a non-attainment area or may, particularly in the North East corridor, cover several non-attainment areas.

The administrators of commercial vehicle fleets are constantly examining ways to control costs. If they perceive that their costs of operating a fleet will escalate as a result of fleet-specific provisions of the Clean Air law, they will immediately consider alternatives to a company-provided car. The additional costs to fleets attributable to the Clean Air law include:

1) increased cost of vehicles,
2) uncertain resale market,
3) potential variations in state implementation plans,
4) unknown price of alternative fuels,
5) uncertain availability of alternative fuel outside of the non-attainment areas,
6) unknown range of alternative fuel vehicle, and
7) increased downtime for refueling.

The administrators of fleets which are comprised primarily of passenger vehicles and are not centrally-fueled or centrally-garaged can avoid these additional costs by simply discontinuing their practice of providing vehicles to employees and, in the alternative, adopt a program to reimburse drivers for the business use of each employee's personal car. The result of driver reimbursement programs is that such fleets would not be affected since the drivers' personal vehicles do not seem to be covered by any proposal.

Driver reimbursement also means a significant loss of domestic motor vehicle sales once the total decision on vehicle preference and financial responsibility is transferred from the employer to the driver (corporate-managed fleets are comprised of over ninety-five percent domestically-produced vehicles, the same statistic for consumer-purchased vehicles is approximately sixty percent). Individual vehicle owners would also use the vehicle for a much longer period of time than the employer which would further reduce domestic vehicle sales. It should also be noted that today such vehicle fleets utilize late model vehicles that contain the most up to date emission technology. If individuals purchased the vehicles under a reimbursement program and kept them in service for extended periods, the benefit of having these fleets be comprised of vehicles operating under the most modern clean air technology would also be lost. In addition, vehicles in corporate-managed fleets are typically subject to very extensive maintenance programs whereas individually-owned vehicles often receive minimal maintenance. Thus, if alternative fuel proposals for vehicle fleets are extended to fleets which are not centrally-fueled and centrally-garaged, the result of the law could be to remove very clean running vehicles from the Nation's highways and replace them with vehicles that contribute to the air quality problem.

PHH believes that the definition of "fleet" or "fleet operator" should be limited to the entity having direct control over the selection and operation of the vehicles. The definition should not include the owner of the vehicle. Vehicle leasing companies, banks and other financial institutions may be the technical owner of the vehicle but have little, if any, control over the day to day operation of the vehicle. Including owners in the definition of "fleet operator" would not add any benefits to improving clean air quality but may reduce current financing flexibility to the fleet operator should some leasing companies, banks or other financial institutions leave the market rather than become susceptible to uncertain regulations by a state governor.

PHH welcomes the opportunity to participate in the Environmental Subcommittee's consideration of alternative fuel provisions of the Clean Air bill now before the Senate. I would be pleased to respond to any questions you or your staff may have on any of the issues discussed herein or any other issues relating to the operation of commercial fleets of passenger automobiles and light duty vehicles that do not utilize a central fuel station.

Sincerely,

Samuel H. Wright

Samuel H. Wright

SHW/sm
1002-2-6

STIRLING ENGINE ENVIRONMENTAL DEMONSTRATIONS

Testimony Before the
Subcommittee on Environmental Protection
Committee on Environment and Public Works
United States Senate
January 11, 1990

Mr. Chairman and Members of the Subcommittee, I am Bruce Goldwater, General Manager Power Systems Division of Mechanical Technology, Inc. (MTI). I thank you for the opportunity to be here today to present testimony on an R&D success story, and to tell you of the benefits which will accrue from an alternative engine demonstration program over the next five years. Over the years I have appeared before both House and Senate Committees to request support for the Stirling Engine Program. This program has been a successful example of government supported high risk technology development. The Congress, by its unwaivering support, has established the United States as the world leader in Stirling technology. You can be comfortable that the decision was correct. Today, while the automotive application for which the engine was initially designed remains elusive, significant interest in the use of the engine for space and underwater propulsion and power applications has been generated. Today, for example, we are working on a four year program under NASA's CSTI high capacity power initiative to develop a practical Stirling engine for future space missions. Other strong application interest exists in specialty vehicles and stationary units for cogeneration and cooling using natural gas as a fuel.

The Stirling technology being addressed, a DOE funded NASA/LeRC managed program, has achieved over the past ten years the national goals described in the Automotive Propulsion R&D Act of 1978. Once again, it was not a major national corporation which achieved this feat, but my small high technology company in upstate New York.

In the early 1970's, a number of Senators and Congressmen realized that the nation needed engines for the future, which could use a variety of fuels interchangeably, be environmentally beneign, have at least 30% better gas mileage than we are used to, and have an affordable price. The NASA Jet Propulsion Laboratory was commissioned by Ford Motor Co. to determine which engine options might possibly achieve such ambitious goals. The results of the study indicated that there were two prime contenders; advanced turbine engines and Stirling engines. Congress initiated four competing engine development programs. MTI's Stirling program was the only successful result.

At the time of the study, Stirling engines were little more than a laboratory curiosity. The concept of a Stirling engine was invented by Rev. Robert Stirling in 1816, when he sealed air inside a basic engine design, and alternately heated and cooled it, from the outside. The alternate heating and cooling causes expansions and contractions which alternately pushes and pulls on the pistons, thus powering the engine. In the 1800's, such simple Stirling designs were used to pump water from coal mines, using the "tailings" from the mining operation as fuel.

By the early 1970's, many different Stirling sizes and designs had been built and tested, but with little success. Theoretically, they remained the most efficient of all engine options, but experimentally, they were too heavy, too bulky, contained very expensive metals in order to withstand the heating part of the cycle, and were not durable and reliable. With the passage, in 1978, of the Automotive Propulsion R&D Act, the Authorization of Stirling R&D (and turbine R&D) became reality, and the effort to make viable Stirling designs began.

In 1979, Senator Tom Harkin, then Congressman Tom Harkin, chaired the Subcommittee on Transportation of the House Committee on Science and Technology. He chaired the early hearings overseeing the onset of the Stirling R&D and saw, in detail, the formidable obstacles to be overcome. At that time, the most advanced Stirling technology resided in Sweden, and our company formed a team to include the Swedish company USAB and AM General Corporation, then a subsidiary of American Motors.

In 1979, the Swedish engines were extremely heavy, contained large amounts of cobalt, had severe sealing problems and were of a complex design. The goal was to build from this immature Swedish design to a viable, fully developed market competitive engine, with less than $130 million. It should be noted that significantly more is spent on introducing new versions of current engines to the market. In the ensuing years, not only were the technical problems formidable, but the budget constraints of the Reagan years forced this program to be congressionally mandated year after year. Constantly facing the threat of termination, we continued to excel in technical performance, meeting the program's legislative and contractual goals. The weight has been removed from present engine designs, the efficiency greatly exceeds that of any other engines in the same horsepower range, and the emissions are below any forseeable regulations. All this with a quiet engine as well, that can be manufactured at a competitive cost.

Today, the Stirling program has test vehicles operating, and thanks to Senator Mikulski's Appropriating Subcommittee, a multi-engine, environmental demonstration program is about to begin at a low funding level ($3M). This first step towards commercialization is expected to stimulate the process of lowering engine manufacturing costs, giving the nation this sorely needed, highly efficient, multi-fueled, environmentally benign, engine option. A highly respected engine manufacturer is involved in this program, and user groups are coming forward to be the first to try the engine in a variety of applications.

It is clear to those of us who have been involved in this program since its inception that we have a winner. America now has an engine option which gives us the needed flexibility to address oil and gas interruptions. We have a technology which can drastically lower space power costs, and we have a potential option for agriculture, which sorely needs economic relief. Not only are these things true, but we also have a new American option for overseas sales to offset the increasing trade deficit. These things have evolved in a slow but sure fashion to date, and will continue in the same manner in the future, but the inescapable fact is that America is probably only 2-3 years ahead of the foreign competition at this time. It behooves the Congress to ensure that we keep this lead. The American taxpayer has something to be excited about with Stirling Engines.

Available engine technology today is in the form of a Stirling engine which can meet all of the President's Clean Air goals, using unleaded gasoline. Hydrocarbon and CO emissions are dramatically below the President's goals. This technology is now well along. A pickup truck now has 22,000 miles on a Stirling engine, without internal engine maintenance. A Stirling postal vehicle is now in service in the Washington area.

Under Provisions Relating to Mobile Sources in the Clear Air Amendments, the President proposed the following emissions standards for passenger cars:

	gms per mile	
	1992	1995
NOx	1.0	.7
Hydrocarbons	.41	.25
CO	3.4	3.4

Light Duty Trucks have higher limits of .41 to .50 gms per mile hydrocarbons, and 4.20 to 5.50 grams per mile of CO. At 20 degrees Fahrenheit, the limit is 10.0 gms per mile for CO.

In the Fall of 1988, a light duty truck (Dodge D-150) equipped with a Stirling engine was tested by independent laboratories in Denver, Colorado and at Southwest Research Institute, San Antonio, Texas. As shown in Figures 1 through 3, operating on unleaded gasoline, this truck achieved the following emissions levels:

NOx - .78 gms per mile highway
Hydrocarbons - .005 gms per mile highway
CO - .12 gms per mile highway
CO at 35 degrees F = .22 gms per mile (≈.35 @ 20°F)

Using the 3-phase Federal Test Procedure, which requires a cold engine start followed by urban and highway driving cycles, the Stirling truck achieved the following results on unleaded gasoline at Southwest Research Institute and in Colorado.

NOx - .77 gm per mile
Hydrocarbons - .14 gm per mile
CO - .70 gm per mile
CO at 35 degrees F - 2.1 gms per mile (expected to be 3.5 at 20 degrees F)

As may be seen in the above independently determined values, the Stirling is already dramatically below the President's initiative in CO and hydrocarbons, below the 1992 goals for NOx, and very close with respect to the 1995 requirements for NOx. All this using unleaded gasoline and without a catalytic converter. And improvements continue to be made.

The White House Press Announcement of June 12, 1989, regarding the Clean Air Act Amendments, puts the cost of meeting the President's mobile source goals at $3-4 Billion (page 8), by radical changes in fuels infrastructure and engine materials and designs. The Stirling engine, after $130M in development costs, has already achieved much better results than the President's goals in CO and hydrocarbon emissions. NOx emissions are well under the President's 1992 goals and very close to the President's 1995 goals.

If this isn't sufficient to become excited about, it should be noted that the D-150 pickup truck is equipped with three fuel tanks - each with a different liquid fuel. Driving tests indicate that the driving performance and emisisons are virtually unchanged and independent of fuel type. This experimental truck has now gone 22,000 miles (1192 hours) with a 94% availability factor.

The possibility exists that Stirling technology can be commercialized in the near term, saving billions of dollars in infrastructure changes, and attaining a cleaner environment than the President's plan envisions. The incentive contained in the HUD Appropriations Bill, under NASA/Technology Utilization, is a key starting point in this process.

The technology and product spinoffs from this program continue to evolve, and they are substantial in number and benefit. NASA has found that the Stirling engine can provide low cost space power. A particular engine design is being funded to operate from the heat generated by either nuclear reactors or solar reflectors. One NASA study indicates potential space power cost reductions of $2 billion in launch costs. Other applications include military generators, gas heat pumps, remotely piloted underwater vehicles, and cogenerators. It should be pointed out that a variety of funds including gas industry and private sector monies are now coming into this program to fund these various applications. What is needed is an agressive sustaining program by the government to launch this engine technology. Critical is this need for demonstrations to encourage end user acceptance and field evaluation to assure the reliability and readiness of the technology. Examples of these demonstration alternatives follow.

- The Stirling engine will meet the power requirements of Class I (6000 lbs. and under) delivery vehicles. The engine will be capable of operating on any fuel desired by the end user including methanol and natural gas. Since the vehicle can be equipped with dual fuel systems, the delivery vehicles can use the fuel necessary for compliance in areas such as California within which it is operating. Regardless of the fuel used, the engine will always be able to provide the lowest emissions of the fuel used without an efficiency penalty or use of a catalytic converter.

- The State of Colorado has a particularly difficult problem with temperature dependent CO production by IC engine powered vehicles. The Stirling engine has LOW CO production characteristics and does not experience the exponential problem of increasing CO with lower temperatures experienced by IC engines. This lower CO production is a result of the excellent, high efficiency combustion system of the Stirling and not by catalytic reduction of exhaust products.

- New Jersey poses a particularly challenging environment for engine driven electric displacement applications such as cogeneration, engine chiller drives and industrial process air compressors driven by engines. The

NJ emissions standards for IC engines is now more stringent than those imposed by the State of California. Any new engine emitting source needs to be BACT. The Stirling engine not only has the low emissions necessary for a cleaner atomosphere but also has the capability of lower noise pollution due to the inherent low noise emissions of the engine. In addition, the Stirling engine also does not consume lubricating oil nor does it contaminate lube oil like an IC engine does. This eliminates the need for frequent oil changes and disposal of the hazardous waste in already at capacity landfills on on the eastern seaboard.

- The Stirling engine has a unique capability for being able to operate on a wide variety of fuels, either liquid or gaseous. One of the great emission challenges of the Gulf coast is the reduction in emissions from the nation's refineries and chemical plants. All of these facilities have flare stacks to accomplish open burning of waste gas products from chemical processes. The waste gasses have a varying BTU quality and constituent makeup which make them unusable as a fuel in an IC engine. The open burning releases the total energy content of the fuel to the atmosphere where the heat generated and the resulting emissions add to the pollution burden. The Stirling, on the other hand, can utilize these waste gasses as fuel to generate power and, because of the excellent combustion characteristics, burn these waste gasses as cleanly as can be expected.

- The nation's growing pollution problem is not only stimulated by inefficient fuel combustion but by inadequate utilization of fuels and waste products available. One growing problem that is enhanced by the overburdened landfills in our nation, in particular in the heavy population areas such as New York and New Jersey, is the release of Methane from the decomposing products in the landfills. Methane has been identified as one of the contributors to worsening atmospheric pollution and global warming. When this gas is recovered and used as fuels in IC engines, the engines not only have to be derrated from their full load carrying capability but also experience an alarming increase of maintenance. The constituents found in landfill gas are variable as the different types of garbage that people discard. Many of the constituents found in the gas almost always include chlorinated hydrocarbons. These hydrocarbons are the major contributing factor to the deterioration of IC engines. These products get entrained in the lube oil and dissolve the engine from the inside out. The Stirling, with its external combustion system, isolates these constituents from the internal workings of the engine. The Stirling will therefore not only burn landfill gas cleaner but operate more maintenance free than a comparable IC engine, all the while providing lower emissions.

- Florida has been identified as the fastest growing state in the nation. Because of this the Florida sewage disposal infrastructure is being pushed to the limits. Because of the warm temperatures of this area of the country, one of the most popular forms of sewage decomposition is by anaerobic digestion. The by products of this digestion are wet gasses, CO2 and Methane, and sulfur laden compounds. These wet gasses result in corrosive by products (carbonic acid, sulfuric acid) when burned in an internal combustion engine. Engines running on this gas experience higher maintenance, contaminated lube oil and difficult to control emissions. The Stirling engine can utilize this substandard fuel efficiently, because of the external combustion, and provide the lowest possible emissions from the utilization of this fuel. The added benefit is that the lube oil does not become contaminated thus eliminating disposal of hazardous waste, an elimination of burned lube oil products being introduced into the atmosphere.

- The Stirling is presently making its debut with the USPS in Washington DC in the vehicle of choice by the USPS, the Grumman LLV. The vehicle is equipped to operate on both diesel and gasoline by merely flipping a switch on the dash of the LLV. The fuel will automatically change over, under power, with no efficiency or performance loss.

TEMPERATURE EFFECTS ON CO PRODUCTION
STIRLING VS ADAPTIVE LEARNING VEHICLES
11% MTBE FUEL

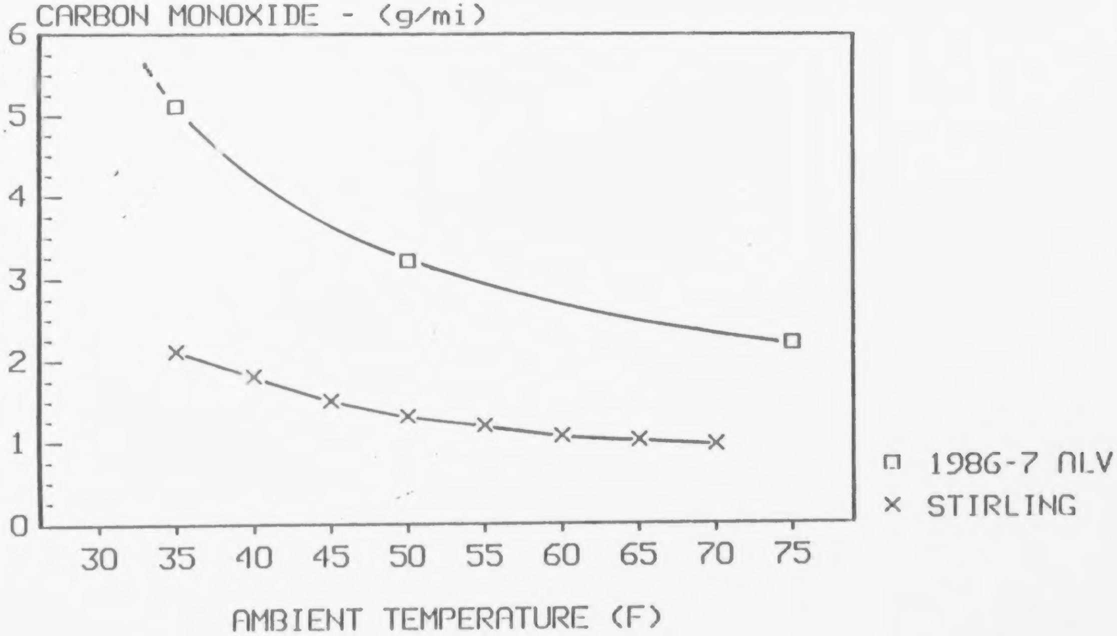
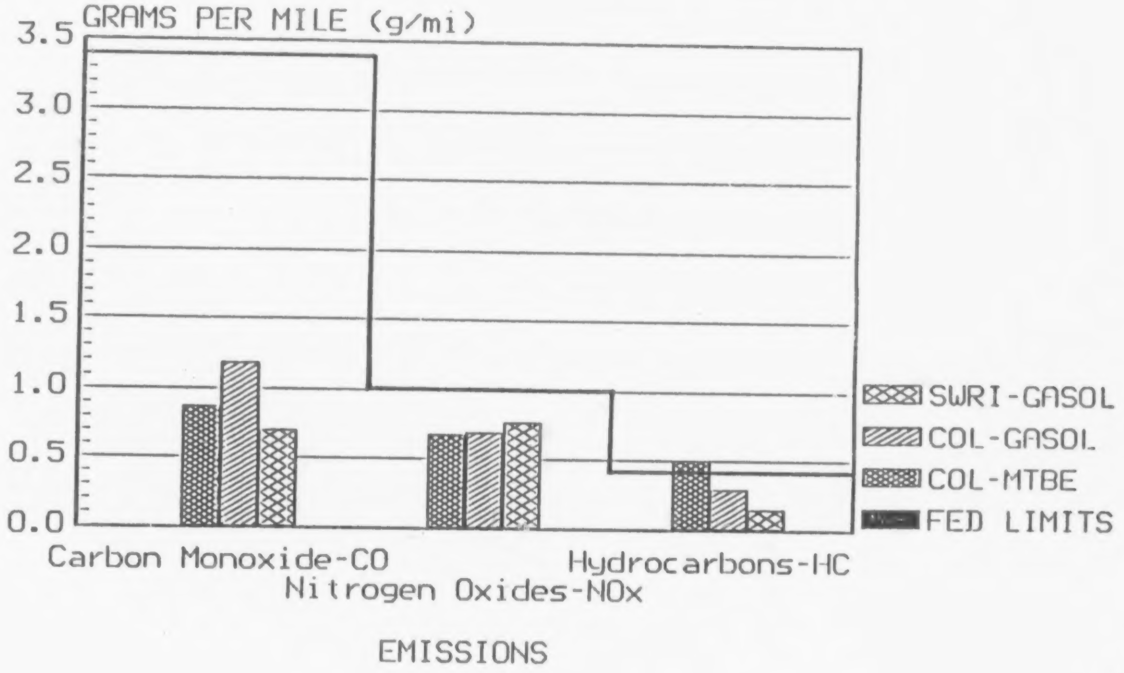


FIGURE 1

STIRLING POWERED PICKUP
3 PHASE FEDERAL TESTING PROCEEDURE



STIRLING POWERED PICKUP
HIGHWAY TESTING PROCEEDURE